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Centre d'Economie de la Sorbonne

CES Working Papers

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2014.62

Maison des Sciences Économiques, 106-112 boulevard de L'Hôpital, 75647 Paris Cedex 13
http://centredeconomiesorbonne.univ-paris1.fr/
ISSN : 1955-611X

Resuming bank lending in the aftermath of the Capital Purchase Program

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July 2014

Abstract

In the second half of 2008, after a series of bankruptcies of large financial institutions, the U.S. Treasury poured capital infusions into domestic financial institutions under the Capital Purchase Program (CPP), thus helping to avert a complete collapse of the U.S. banking sector. In this article the effectiveness of the Capital Purchase Program is analysed in terms of restoring banks' loan provisions. The relative impacts of liquidity shortages (which negatively affected banks' willingness to lend) and the contraction in aggregate demand for bank loans are examined. The empirical evidence on the effects of capital shortages supports the theory. Banks that have a higher level of capitalisation tend to lend more both during the crisis and in normal times. Moreover, it is found that bailed-out banks displayed higher growth rates of loans during the crisis than in normal times (before 2008) as well as higher rates compared with non-bailed banks during the crisis, with a one percentage point increase in the capital ratio. In addition, bailed-out banks that repurchased their shares from the U.S. Treasury provided more loans during the crisis than those banks that did not.

Keywords: Capital Purchase Program, bank lending, credit growth, liquidity provisions

JEL Classification Numbers: E58, G21, G28

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Résumé

Dans la seconde moitié de 2008, après une série de faillites de grandes institutions financières, la Réserve Fédérale américaine a réagi au manque de liquidité à travers la garantie obligatoire des prêts et des recapitalisations bancaires principalement dans le cadre du Capital Purchase Program (CPP) pour les banques commerciales pour afin éviter l'effondrement du secteur bancaire américain. Dans cet article l'efficacité du CPP est analysée en termes de restauration d'octroi de crédits bancaires. Les impacts relatifs du manque de liquidité (qui a négativement affecté la volonté des banques à prêter) et de la baisse de la demande globale pour les prêts bancaires sont examinés. La preuve empirique sur les effets du manque de liquidité soutient la théorie. Les banques avec un niveau de capitalisation élevé ont tendance à octroyer plus de crédits au cours de la crise et en temps normal. En outre, les banques renflouées ont affiché des taux de croissance des prêts plus élevés au cours de la crise qu'en temps normal (avant 2008) ainsi que des taux plus élevés par rapport aux banques non-renflouées pendant la crise, avec une augmentation d'un point de pourcentage du ratio de capital. De plus, les banques renflouées qui ont racheté leurs actions auprès du Trésor américain offraient plus de prêts au cours de la crise que les banques qui ne l'ont pas fait.

1 Introduction

The well-functioning banking sector is often said to play a crucial role in cultivating business activity. Indeed, financial distress as well as the lack of confidence that undermined banking activity during the crisis of 2007 immediately affected the real economy. Governments had to undertake conventional and ad hoc measures offering liquidity in the form of bailout packages. The main program that provided liquidity to U.S. commercial banks was the Capital Purchase Program (CPP). The goal of these interventions was to stabilise the financial system by providing capital to viable financial institutions (see details in Isyuk, 2013a). However, there is still no clear evidence of the efficacy of public (as opposed to market-based) capital injections for sustaining bank loan growth.

Empirical studies show that loan provisions to the private sector tend to slow down during banking crises (Kaminsky and Reinhart, 1999; Eichengreen and Rose, 1998; Demirgüç-Kunt *et al.*, 2006). There can be several reasons for that. On one hand, the literature focuses on the vulnerability of banks' balance sheets and their sensitivity to liquidity shortage. That transmission channel of credit supply to the real economy is investigated in Black and Rosen (2009); Hirakata *et al.* (2009); De Haas and van Horen (2010); Berrospide and Edge (2010); Brei *et al.* (2011). It is confirmed that the bank's balance sheets position greatly affects the bank's credit offer to enterprises and individuals.

On the other hand, credit growth can decelerate not only due to the financial conditions of the bank and its willingness to lend, but also due to the deterioration in demand for bank products and services. The same adverse exogenous shocks that triggered the problems with bank's liquidity can induce the decline in the aggregate demand (Dell'Ariccia *et al.*, 2008). The overall decline in economic activity negatively affects the willingness of the individuals and firms to borrow, both for consumption and investments. Besides, as highlighted in Dell'Ariccia *et al.* (2008), the credit cycle effect à la Kiyotaki and Moore (Kiyotaki and Moore, 1997) can occur during the crisis. In that case, even creditworthy borrowers see the value of their collaterised assets (as well as their balance sheets) to deteriorate, which leads to a decline in the credit offer, even by healthy banks.

Thus, there is a link with the literature focusing on disentangling the relative impacts of demand and financial shocks (Tong and Wei, 2009b; Claessens *et al.*, 2012). These authors suggest several indexes for measuring the sensitivity of the nonfinancial firms to demand shocks that could be also applied to the financial sector.

This paper uses the methodology of Brei *et al.* (2011) in order to estimate the impact of bank capital, other bank balance sheet characteristics, and sensitivity to demand shocks on bank lending. That framework allows for the introduction of structural changes in parameter estimates for the period of the crisis and for normal times, as well as for bailed-out and non-bailed banks. While Brei *et al.* (2011) focus on the data regarding 108 large international banks, in this paper the focus is on the U.S. commercial banks and the role of the CPP in resuming bank lending.

This paper contributes to the literature on the efficacy of public capital injections during the crisis. It provides the framework in which the sensitivity of the bank's credit offer to financial distortions and its sensitivity to decline in aggregate demand are separated from each other[1]. The relationship between bank balance sheet characteristics, sensitivity to the demand shock, and bank credit growth is analysed for the banks that received CPP funds and the banks that did not participate in the CPP in normal times and during the crisis. Moreover, the same relationship is also investigated for the subsample of the financial firms that received the CPP funds in order to distinguish between the banks that repurchased their stake from the U.S. Treasury and the banks that did not repurchase their stake by July of 2012.

The great deal of this paper is focused on pre-testing the models and selecting the adequate instruments for the estimators with instrumental variables. The full version of this paper (Chapter 4, Isyuk, 2013b) includes six types of estimators that prove to be to some extent more and to another extent less advantageous when dealing with particular econometric issues. The detailed results are presented only for Mundlak-Krishnakumar and Blundell-Bond system GMM models, while the summary results for all estimators are presented in section 4.3. I start with fixed effects estimator that, however, does not allow us to obtain the parameter estimates for the time-invariant variables (such as bailout or repayment dummy). Besides, as the model is dynamic, the fixed effects estimator is inefficient and might lead to inconsistent estimates. The Mundlak-Krishnakumar model (Mundlak, 1978; Krishnakumar, 2006) is then conducted and, on one hand, provides the estimates for time-invariant variables and, on the other hand, following Chatelain and Ralf (2010), is used as a pre-test estimator that helps to select instrumental variables for further estimations. The Hausman-Taylor estimator (Hausman and Taylor, 1981) enables the separation between exogenous and endogenous time-variant and time-invariant variables. With regard to the endogenous nature of the bailout dummy, it is expected to obtain consistent and efficient estimates using that method.

The logit regression from Isyuk, 2013a is then used as a first-stage in the Two Stage Least Squares (2SLS) model based on instrumental variables (IV). The bailout dummy is

[1]In most of empirical studies, demand factor is proxied by changes in the GDP of the country. It means that they do not take into account heterogenous reactions of the financial institutions to the changes in aggregate demand (see Berrospide and Edge, 2010; Brei *et al.*, 2011).

instrumented using the proxy for systemic risk (beta) and the share of mortgage-backed securities in a bank's total assets. The fitted values of bailout dummy are then plugged into the second stage regression. The final models are Arellano-Bond first-difference (Arellano and Bond, 1991) and Blundell-Bond estimators (Blundell and Bond, 1998) that use Generalised Method of Moments-style (GMM) instruments and are often referred to as one of the most efficient estimators when working with large number of observations and small-time dimension datasets and when fitting the dynamic model.

The empirical evidence on the effects of capital shortage supports the theory. Banks with a higher level of capitalisation tend to lend more both during the crisis and in normal times. This result is in line with that of Francis and Osborne (2009), who use data on U.K. banks and report that better-capitalised banks are more willing to supply loans. The same is confirmed by Foglia *et al.* (2010), who also find that this effect is intensified during the crisis.

Moreover, during the crisis, bailed-out banks exhibited higher growth rate of loans than in normal times (before 2008) and higher than that of non-bailed banks during the crisis, with a one percentage point increase in capital ratio. This means that liquidity provisions to the banks during the recent crisis supported bank lending. Besides, these results extend those from Isyuk (2013a) suggesting that bailed-out banks were also the ones that could contribute to a larger extent to the rise in credit offer. It also seems that the banks that were characterised as specialised in commercial and industrial lending and that exhibited higher probability of receiving CPP funds (see Isyuk, 2013a for details) were also the ones that contributed to a larger extent to the growth rates of loans (thus, mostly commercial and industrial loans, as they were specialised in that type of lending).

The same results also show that during the crisis, more capital is required for the non-bailed banks to sustain the growth of credit supply on a pre-crisis level. In tough times, additional capital is not that easily translated into extended credit offers by the banks that did not benefit from the CPP program, as they prefer to keep a substantial part of it for their internal needs.

It seems that the banks that repaid CPP funds by July 2012 were the ones that received enough additional capital to support their operations during the crisis and to continue providing credits to enterprises and individuals. In their case, the recapitalisation scheme worked efficiently, providing them the possibility to repurchase their stake from the Treasury and to translate additional capital into more lending.

It is also in line with the results of Brei *et al.* (2011), who argue that the banks-recipients of CPP funds start to translate additional capital into greater lending during the crisis once their capitalisation exceeds a critical threshold. That critical threshold should also account for the commitment to reimburse the CPP funds. The bank that is not capable of repurchasing its stake from the Treasury cannot be expected to expand the credit offer to enterprises and individuals. It is more probable that such a bank will adjust its assets portfolio to meet the capital requirements by cutting the number of newly issued loans.

The rise in aggregate demand contributes to the increase in bank lending in good times. However, during the crisis, the situation changes, especially for different types of loans. For instance, since 2007, the demand factor has had no impact on the growth rates of real estate mortgage loans for non-bailed banks. With the collapse in housing markets and generally unstable economic situation, consumers were less willing to take new mortgages.

The rest of the paper is structured as follows. Section 2 presents the description of the model, estimators, econometric issues related to endogeneity bias as well as the selection procedure of the optimal instruments for system GMM. The data and the construction of variables are explained in section 3. Section 4 reviews the detailed results for Mundlak-Krishnakumar and Blundell-Bond system GMM models as well as summarizes the results from other estimators in section 4.3. Section 5 concludes.

2 Model and estimation methodology

2.1 Model

In this empirical model, bank lending between 1995 and 2011 is explained by two core factors: banks' financial constraint (or, in other words, the level of capitalisation) and their sensitivity to the shocks on aggregate demand. However, the period between 1995 and 2011 includes intensive growth (2001-2006), recession (2007-2009), as well as the period of sluggish economic growth following the recession (after 2009). Besides, substantial liquidity injections into the banking sector under the CPP took place during the recession in 2008-2009.

Such particular conditions during the analysed period cannot be ignored. They represent significant structural changes that may have affected the relationship between bank-specific factors and bank lending.

Thus, the parameter estimates are allowed to change for two states of economy: crisis and normal times. Besides, the parameters shift for the banks-beneficiaries of the CPP funds relative to the banks that did not receive the funds. Moreover, the subsample of the banks-recipients of CPP funds is analysed in order to check for differences in the same relationship among the banks that repurchased their stock from the U.S. Treasury in short notice (before July 2012) and the ones that did not.

The differential behaviour between the periods of time and banks is introduced in the model via dummies and their interactions with individual financial bank characteristics and sensitivities to changes in aggregate demand.

The first full specification of the dynamic panel regression following Brei *et al.* (2011) and Gambacorta and Marques-Ibanez (2011) is the following:

$$\Delta Ln(L_{it}) = \phi_0 + \phi_1 C_t + \eta \Delta Ln(L_{i,t-1}) + \chi_1 Z_{t-1} + [\chi + \chi^* C_t] B_i + [\delta + \delta^* C_t + (\omega + \omega^* C_t) B_i] BSC_{i,t-1} + \alpha_i + \epsilon_{it} \quad (1)$$

where

- $\Delta Ln(L_{it})$ is the growth rate of lending at the bank i during the year t ;
- $BSC_{i,t-1}$ are lagged bank-specific characteristics associated with financial and demand constraints of commercial bank i;
- Z_{t-1} are lagged macroeconomic controls (real GDP growth, change in Federal Funds interest rate);
- C_t is the dummy that distinguishes between the crisis period and normal times;
- B_i indicates the banks that received the CPP funds relative to those that did not;
- α_i represents random bank effects; and
- ϵ_{it} are observation-specific errors.

This model is estimated using fixed effects, Mundlak-Krushnakumar, Hausman-Taylor, Instrumental Variables (IV), Arellano-Bond first difference, and Blundell-Bond system GMM estimators. Each of these estimators transforms Equation 1 in a particular way in order to obtain efficient and consistent estimators. Clearly the estimators that are based only on within-transformation of the variables do not allow for the estimation of time-invariant variables, such as the bailout dummy. Hence, when using fixed effects and Arellano-Bond first difference estimators, the bailout dummy as well as the interactions between bank-specific variables and the bailout dummy are omitted from model 1, described above.

Another group of regressions is run on a subsample of 252 banks-recipients of CPP funds. The cofficients similar to those from the previous regression are marked herein with a subscript b. Here the differential relationship is allowed for the banks that redeemed their stake from the Treasury and those that did not:

$$\Delta Ln(L_{it}) = \phi_{b0} + \phi_{b1}C_t + \eta_b \Delta Ln(L_{i,t-1}) + \chi_b Z_{t-1} + [\chi_b + \chi_b^* C_t] R_i + [\gamma + \gamma^* C_t + (\kappa + \kappa^* C_t) R_i] BSC_{i,t-1} + \alpha_{bi} + \epsilon_{bit} \quad (2)$$

where R_i specifies the banks that reimbursed the CPP funds before July 2012 and the banks that did not pay anything (in the subsample of banks-recipients of CPP funds).

The same estimators as for model 1 are used to estimate model 2. R_i is the time-invariant repayment dummy, and thus, it is also omitted when using fixed effects and the Arellano-Bond first difference estimator.

Individual bank-specific characteristics $BSC_{i,t-1}$ include balance sheet indicators that account for supply factors that influence a bank's decision regarding the offer of the loans. The bank's financial constraint is mainly associated with its level of capitalisation. During the crisis, for instance, a bank's capital ratio is expected to worsen due to the bank's losses in subprime mortgage-related assets (it can also be any other adverse capital shock or even change in banking regulation). If the bank does not have enough capital buffer and cannot raise equity[2], it is expected that the bank will tend to adjust its capital ratio by cutting the number of newly issued loans.

In the literature, this question is often referred to as a trade-off between the marginal costs of issuing equity and the marginal cost of cutting back on lending. The results of the study conducted by Kiley and Sim (2010) suggest that the banks respond to a capital shock through a mix of financial disintermediation and recapitalisation. Besides, instead of just including macroeconomic controls on the country level (as was done, for instance, in Brei *et al.*, 2011), the individual levels of sensitivity to changes in U.S. real GDP are computed. They account for heterogeneous reactions of commercial banks to expansion or contraction of the aggregate demand. These bank-specific sensitivities to changes in GDP are introduced as proxies for the impact of demand factors on the bank's lending activity.

The basic idea of parameter estimates for interactions between crisis, bailout, and repayment dummies with sensitivity to GDP growth and balance sheet characteristics is similar. The estimation of the models described above results in the set of coefficients for any bank-specific factor (both balance sheet characteristic or sensitivity to demand shock), presented in table 1.

These various coefficients allow us to explore the impact of supply and demand factors on loan growth and to see how it changes (i) in the period of crisis compared to normal times; (ii) between the banks that received CPP funds and the banks that did not participate in

[2]That is the case, for instance, when the bank is not approved for the CPP funding.

Table 1: Resulting set of coefficients for the bank-specific characteristic BSC_1 and its interactions with dummies from models 1 and 2

Banks/Periods		No Crisis	Crisis
All banks			
No Bailout		δ_1	$\delta_1 + \delta_1^*$
Bailout		$\delta_1 + \omega_1$	$\delta_1 + \delta_1^* + \omega_1 + \omega_1^*$
	No Repayment	γ_1	$\gamma_1 + \gamma_1^*$
	Repayment	$\gamma_1 + \kappa_1$	$\gamma_1 + \gamma_1^* + \kappa_1 + \kappa_1^*$

the CPP; and (iii) between the banks that repurchased their stake from the Treasury by July 2012 and the banks that did not. The fact of the bank bailout means that the bank applied for CPP funds, was approved by the U.S. Treasury and accepted the final conditions by providing required documentation. Conversely, there are two possible reasons that the bank did not to receive the bailout: either the bank did not apply for CPP funds (because it had access to alternative sources of financing or did not require recapitalisation during the crisis), or the bank's application for participation in the CPP was rejected by the Treasury (for more discussion on that topic, see Isyuk, 2013a).

The coefficient δ_1 shows the short-term impact of the change in variable BSC_1 on bank lending at non-bailed banks in normal times ($B_i = 0$; $C_t = 0$). The long-term effect is given by $\frac{\delta_1}{1-\eta}$ for model 1 or by $\frac{\delta_1}{1-\eta_b}$ for model 2. When the coefficient δ_1^* is significant, it means that the relationship between the underlined variable BSC_1 and bank lending is significantly different in crisis time compared to normal times for non-bailed banks. The full impact is then calculated as $\delta + \delta^*$. Other coefficients are interpreted in a similar way.

In tables with results individual coefficients δ, δ^*, ω, and ω^* for model 1 and γ, γ^*, κ, and κ^* for model 2 are reported with stars identifying their level of significance, while the coefficients measuring the full impact ($\delta + \delta^*$, $\delta + \omega$ etc.) can be found in square brackets.

2.2 Endogeneity bias

Dynamic panel models 1 and 2 presented in section 2.1 allow for, on one hand, empirical modeling of dynamic effect through the lagged dependent variable (past behaviour affecting current one); on the other hand, individual-specific dynamics. When estimating these models, however, several econometric issues related to endogeneity bias may arise. They are described below followed by the proposed solution in form of the alternative estimator.

- Correlation between the lagged dependent variable $L_{i,t-1}$ and individual random effect

ϵ_{it}. Nickell (1981) reports that standard methods of estimation such as within estimator and Ordinary Least Squares (OLS) can lead to seriously biased coefficients in dynamic models (often referred to as "fixed effects Nickell's bias"). This issue is particularly important in case of panel datasets with large number of individuals and small number of time periods. It is said that within autoregressive parameter bias is larger when the number of time periods T is small (less than 10), negligible when T is larger than or equal to 30. In the full sample of banks examined in this paper the average number of available time periods is 10.1, while the maximum number of periods is 16 (annual data between 1995 and 2011), suggesting that the coefficients obtained via within estimator (presented in the following section) can be biased. The models that deal with autoregressive bias and that are designed for short time dimension and large entity dimension datasets are those based on Generalised Methods of Moments Estimator (GMM).

- Endogeneity of time-invariant variables B_i and R_i due to their correlation with individual-level random effect. This issue can be treated using the Hausman-Taylor estimator (Hausman and Taylor, 1981). That estimator assumes that some of the explanatory variables are correlated with the individual-level random effects, but that none of the explanatory variables are correlated with the idiosyncratic error. Endogenous bias of time-invariant variables is corrected using internal instruments. In that sense Hausman-Taylor estimator improves over Fixed Effects (because it allows to estimate the parameters for time-invariant variables) and over Mundlak-Krishnakumar estimator (that does not deal with the endogeneity of time-invariant variables).

- Endogeneity of time-varying indicators (such as bank-specific variables). That bias may arise due to correlation with individual random effects. Within transformation or first-differencing both permit to avoid that problem and obtain consistent parameter estimates.

- The presence of reverse causality. Loans growth rates are assumed to be endogenous; however, causality may run in both directions: bank-specific characteristics influence the growth rates of loans while the growth rates of loans affect bank-specific characteristics (for instance, capital ratio). Besides, the bailout dummy is endogenous as it is the consequence, on one hand, of the particular bank's decision (as the bank chooses to apply or not for the Capital Purchase Program and later accepts or not the final conditions attached by the Treasury), on the other hand, of the Treasury's decision (acceptance or refusal of the bank's application for CPP funds, more on that see in

Isyuk, 2013a. In that case, the method of Instrumental Variables is efficient as it provides unbiased coefficients for endogenous regressors through the two-step estimation procedure.

- Dealing with endogeneity bias using the instruments that are too many and weak. That is the issue that often arises when applying Arellano-Bond (Arellano and Bover, 1995) and system GMM (Blundell and Bond, 1998) estimators (see section 2.5). The proper instruments have to satisfy the conditions of validity (exogeneity) and relevancy that is not always the case. GMM estimators are supposed to deal with most of the endogeneity issues presented above, however, the consistency of the parameters obtained for time-invariant variables is not investigated so far.

2.3 Mundlak-Krishnakumar estimator

One of the estimators that allows to gauge the effects of time-invariant variable (as opposed to the estimators such as fixed effects that only use information on within variance of covariates, ignoring the between variance) is Mundlak estimator (Mundlak, 1978), later extended by Krishnakumar (2006). This estimator not only helps to estimate the impact of time-invariant variables but also, when used as a pre-test estimator, to decide which time-varying variables are endogenous and which are not(Chatelain and Ralf, 2010). This information will be then useful in Hausman-Taylor, IV and GMM estimators that require distinguishing between exogenous and endogenous variables and selecting appropriate instruments.

The basic methodology of Mundlak-Krushnakumar estimator is presented below. The model 1 contains both time-series cross-section data and time-invariant variables and can be rewritten in the following simplified form:

$$y_{it} = \beta x_{it-1} + \gamma b_i + \alpha_i + \epsilon_{it} \tag{3}$$

where y_{it} is dependent variable; x_{it-1} are lagged time and individual varying explanatory variables; b_i are time-invariant explanatory variables (or dummies); α_i are individual random effects, and β and γ are coefficients to be estimated for time-varying and time-invariant variables, respectively. The error term ϵ_{it} is assumed to be uncorrelated with x_{it-1}, b_i and α_i. As there is no theoretical evidence yet on the adequacy of Mundlak model with autoregressive variables, lagged dependent variable y_{it-1} is removed from the model.

The difficulty of estimation of that model is the potential correlation of individual effects α_i with x_{it-1} and especially with time-invariant variables b_i. Mundlak (1978) proposes to use an auxiliary regression to account for such a relationship:

$$\alpha_i = \pi x_{i\circ} + \phi b_i + \alpha_i^M \tag{4}$$

where x_{i0} is average over time for each individual of time-varying variables, π and ϕ are coefficients to be estimated for these averages and time-invariant variables, respectively.

Combining auxiliary regression with initial regression yields the following equation:

$$y_{it} = \beta x_{it-1} + (\gamma + \phi) b_i + \pi x_{i\circ} + \alpha_i^M + \epsilon_{it} \tag{5}$$

Applying Generalised Least Squares (GLS) model to estimate the last equation, Mundlak (1978) showed that

$$\widehat{\beta_{GLS}} = \widehat{\beta_W} \tag{6}$$

$$\widehat{\pi_{GLS}} = \widehat{\beta_B} - \widehat{\beta_W} \tag{7}$$

$$\widehat{\gamma_{GLS}} = \widehat{\gamma_B} \tag{8}$$

where $\widehat{\beta_B}$ and $\widehat{\gamma_B}$ are between estimators, while $\widehat{\beta_W}$ is a within estimator[3].

For each time-varying variable $x_{i\circ}$ Mundlak-Krishnakumar regression tests the null hypothesis $\widehat{\beta_B} - \widehat{\beta_W} = 0$ (Equation 7). Thus, the smaller and the closer to zero is the estimated parameter $\widehat{\pi_{GLS}}$, the more exogenous variable $x_{i\circ}$ is. Later these exogenous x_{i0} variables can be used as instruments in Hausman and Taylor (Hausman and Taylor, 1981) and other estimators (Chatelain and Ralf, 2010).

2.4 Two-step system GMM estimator

In this paper the system GMM is preferred to difference GMM as it allows to include time-invariant regressors into the model as well as to account for heteroscedasticity of model errors.

System GMM is the augmented version of the difference GMM estimator. Initially it was developed to improve the difference GMM estimators as lagged levels were often poor instruments for first-differenced variables[4]. Arellano and Bover (1995) and Blundell and Bond (1998) modified the difference GMM estimator by adding the original level equation to the system. The instruments for the variables in levels are their own lagged first-differences.

[3]Mundlak also proved them to be best linear unbiased estimators (BLUE).
[4]Especially if the variables are close to a random walk

The larger number of instruments allows to increase the efficiency of the estimator.

Two-step system GMM provides an algorithm for computing the *feasible efficient two-step GMM estimator*, where residuals from the first step are used to form the optimal weighting matrix. The efficient GMM estimator is then estimated using that matrix. Therefore the two-step GMM estimates are robust to the presence of heterescedasticity and serial correlation.

The cost of the increased efficiency of system GMM estimator is a set of additional restrictions on initial conditions. Basically it requires first-differences to be uncorrelated with unobserved group effects. Another disadvantage of applying the system GMM estimator is an important rise in the instrument count. In case the lag range is not restricted and the instrument matrix is not collapsed, each instrumenting variable generates one column for each time period and each lag available in that time period. As highlighted in Roodman (2006), the number of instruments is then quadratic in T.

Often referred to as "too many instruments" problem, it can lead to, first of all, overfitting of endogenous variables which could bias coefficient estimates toward those from non-instrumenting estimators. Second, high instrument count could become the reason of imprecise estimates of the GMM optimal weighting matrix and, consequently, downward biased standard errors (see Roodman, 2008 for more details).

The bias and the standard errors can be lowered by using the Windmeijer correction (Windmeijer, 2005) for the two-step efficient GMM. The solution for the former problem requires keeping the number of instrument lags low. The choice of instruments and their lags is described in the next section following the strategies in the literature on the performance of the IV and GMM estimators (Chatelain and Teurlai, 2001; Donald *et al.*, 2009; Mehrhoff, 2009). Additional tests on relevancy and validity of the instruments are presented in section 2.5.

2.5 Choice of instruments for system GMM

2.5.1 Limiting the number of moment conditions

If the number of instruments is too large, GMM estimator becomes inconsistent. In case the number of instruments is not constrained, each instrumenting variable generates one column for each time period and lag available in that time period (Roodman, 2006). In this section 23 variables are treated as endogenous or predetermined for full specifications of models 1 and 2:

- six main variables (lagged dependent variable and 5 bank specific characteristics (BSC_{it}));

- interaction of five BSC_{it} with crisis dummy;
- interaction of five BSC_{it} with bailout (or repayment) dummy;
- interaction of five BSC_{it} with both crisis and bailout (or repayment) dummies;
- bailout (or repayment) dummy and its interaction with crisis dummy (two in total).

The equation is said to be exactly identified when there are at least as many instruments generated as included endogenous variables. On the other hand, the optimal weighting matrix of the GMM estimator has a rank of N (number of banks) at most. This matrix becomes singular and the two-step estimator cannot be computed when the number of instruments exceeds N (Soto, 2009). As the sample contains information on almost 550 financial institutions, the number of generated instruments in system GMM should not exceed 550.

In case the count of moment conditions is not reduced, the standard instrument set provides $\frac{T(T-1)}{2} = 105$ moment conditions for a single lagged dependent variable, $\frac{(T-2)(T-1)}{2} = 91$ moment conditions for each endogenous variable and $T - 1 = 14$ moment conditions for each exogenous variable (Mirestean and Charalambos, 2009).

To reduce the instrument count two main techniques are used:

- **Limiting the lag length** is based on the selection of the lags to be included in the instrument set. Baum *et al.* (2002) advises to constrain the lags between the second and the fifth. In that case the number of moment conditions will be equal to the number of instrumented variables (exogenous, endogenous or predetermined) multiplied by the number of lags used.
- **Collapsing the instrument set** also allows to make the instrument linear in T. The columns of the original instrument matrix are "collapsed" reflecting the fact that orthogonality condition has to be valid for each lag but not any more for each time period.

Some additional transformations can be applied on the instrument set. For instance Mehrhoff (2009) proposes to apply the Principal Component Analysis (PCA) to the instrument set. The transformation matrix becomes then stochastic rather than deterministic. After performing Monte-Carlo simulations the author finds that factorised instruments produce the lowest bias and standard errors, while recommends to collapse the matrix prior to factorisation.

2.5.2 Selection of the optimal instruments

It is not only the instrument count that influences the choice of the instruments for GMM estimations but also the "quality" of these instruments. There exists two criterias for proper instrumental variables in linear IV and GMM regressions. The "good" instruments have to be:

- correlated with endogenous regressors;
- orthogonal to the error process (or, in other words, exogenous);

In the literature the first condition is often referred to as the "relevancy" of instruments, while the second one referred to as the "validity" of instruments. Instruments are said to be weak and the system to be weakly identified, if the instruments are weakly correlated with endogenous regressors (Stock *et al.*, 2002; Bun and Windmeijer, 2010).

There are several methods to deal with the problem of instrument relevance. In this article the correlation coefficients between the set of instruments and endogenous variables are first analysed for each equation. Thus, the correlation tables that report the correlation coefficients between lagged variables in levels (dependent and explanatory variables until the fourth lag) and differenced variables $Y_{it} - Y_{it-1}$, $Y_{it-1} - Y_{it-2}$, $X_{it-1} - X_{it-2}$ are constructed for the first-difference equation. Accordingly such tables are constructed for the variables from the equation in levels but reporting the correlation between lagged first-differences and variables in levels Y_{it}, Y_{it-1} and X_{it-1} (see Appendix A).

The deeper lags of level variables (for the first difference equation) and those of first differences (for the level equation) have a larger probability of being weaker instruments, i.e. being weekly correlated with endogenous regressors[5]. However, the first lags of instruments might be highly correlated with the dependent variable Y_{it} and its first difference $Y_{it} - Y_{it-1}$ which may cast a doubt on the orthogonality between instruments and errors. As mentioned above, the deeper lags might be preferred to the lower ones because they provide a higher probability of instrument independence from unobserved error process. Thus, when selecting the instruments, the trade-off between the level of weakness of the instruments and their exogeneity is taken into account.

Besides, the corresponding moment conditions can be tested if the system of equations is overidentified[6]. It can be done via Hansen statistic in the presence of heteroscedasticity or via Sargan statistic under the assumption of conditional homoscedasticity. Heteroscedasticity is detected in these regressions, so it is the Hansen statistic that is reported in the resulting

[5] That is why the lags deeper than the fourth lag are not analysed.

[6] Overidentification here means that there is a surfeit of instruments.

tables. The null hypothesis of the test implies that the instruments satisfy the orthogonality conditions required for their employment (Baum *et al.*, 2002), and that all together they are valid instruments.

In order to additionally check the orthogonality of some instruments or subset of instruments, the Difference-in-Sargan/Hansen statistic (or C-statistic) is analysed. That statistic basically measures the difference in Sargan/Hansen statistics computed, on one hand, for the regression with the full set of instruments, on the other hand, for the regression with a particular (tested) set of instruments removed from the full one. The null hypothesis is that of the valid subset of instruments.

The two-step robust regressions that normally produce asymptotically more efficient estimators are conducted[7]. It makes the estimators consistent in the presence of any pattern of heteroscedasticity or autocorrelation.

2.5.3 Testing for underidentification and weak instruments

Empirical tests of overdientifying restrictions are often criticized for having a low power. Besides, as highlighted by Bazzi and Clemens (2013), multiple instruments do not allow the detect the possibility of the most valid instruments to be the weakest and the strongest to be the the least valid.

Besides, the first stage regressions where endogenous variables are regressed on the full set of instruments are examined. The Bound *et al.* (1995) F-statistics and "partial" R^2 as well as the Shea's partial R^2 (which is is more relevant as there is more than one endogenous regressor in the model) are analysed for several instrument subsets in order to choose sufficiently relevant endogenous regressors.

The Bound *et al.* (1995) F-statistic allows us to measure the significance of a particular instrument by excluding this instrument from the regression. It is the "squared partial correlation" between the excluded instrument or a subset of instruments and endogenous regressor that is in question, $\frac{RSS_{I1}-RSS_{I}}{TSS}$, where RSS_{I1} is the residual sum of squares in the regression instrumented with I_1, RSS_I is the residual sum of squares in the regression with the full set of instruments (see Baum *et al.*, 2002 for more details).

However, it is not an efficient measure of the fit of regressions, if there are multiple endogenous regressors in the model. The intercollerations among the regressors need to be taken into account. The Shea's partial R^2 is a more consistent measure of the regression's fit in that case.

Thus, additional tests for identification and weak instruments are applied in the paper

[7]A finite-sample Windmeijer correction to the two-step covariance matrix is applied to correct otherwise downward biased standard errors.

following Bazzi and Clemens (2013); Stock and Yogo (2002). The strength of identification is tested via the test of the rank of a matrix based on the Kleibergen-Paap (2006) *rk* statistic. The test allows to check whether the equation is identified, i.e., that the excluded instruments are correlated with the endogenous regressors. The null hypothesis of the test is that the equation is underidentified, meaning when partialling out exogenous covariates and other cross-correlations with endogenous variables and instruments, the weakest correlation between an instrument and one of the endogenous variables does not contribute enough variation to add a rank of the instrument matrix (Bazzi and Clemens, 2013). A rejection of the null indicates that the matrix is full column rank and, thus, that the model is identified. The p-values for the Kleibergen-Paap *rk* statistic under the assumption of heteroscedasticity are presented in tables.

Another group of statistics includes Cragg-Donald Wald and Kleibergen-Paap Wald statistics and allows to test for weak identification. In case of weak identification the correlation between endogenous regressors and excluded instruments is small. However, Cragg-Donald Wald statistic is only valid under the assumption of identically and independently distributed errors (i.i.d.). Thus, it is mostly the second one Kleibergen-Paap Wald F-statistic that is reported.

Following Stock and Yogo (2002), the definition of weak instruments in terms of the relative bias is adopted. A group of instruments is weak if the bias of the IV estimator, relative to the bias of ordinary least squares (OLS), exceeds a certain threshold (5%, 10% or 30% are reported). Relevant critical values for Kleibergen-Paap Wald F-statistic (thus, for the case with robust standard errors) have not been tabulated. However, it is advised in the literature (for instance, by Baum *et al.*, 2007) to apply though with caution the Stock and Yogo critical values initially tabulated for Cragg-Donald statistic. Stock and Yogo critical values are not tabulated for cases with more than three endogenous variables. As in the regressions from this paper there are mostly more than three endogenous variables entering the regressions, the critical values are reported for the case of three endogenous variables, an ultimate available number of instrumental variables and 5%, 10% and 30% maximal bias of the IV estimator relative to OLS. Another way is to follow the original Staiger and Stock (1997) rule-of-thumb that states that the F-statistic should exceed 10. Under the null hypotheses the instruments are weak, and in order to reject the null hypothesis the calculated Kleibergen-Paap Wald F-statistic should exceed the critical value.

3 Construction of the variables

3.1 Data description

To construct the sample of firms, U.S. domestically controlled commercial banks were selected in DataStream. These financial firms operated on the U.S. market in U.S. dollars and were still active in December of 2009. After selecting the variables needed for estimation for the period between 1995 and 2011, around 600 commercial banks were left in the sample.

The data on bailouts (promised amount, actual disbursed amount, the date of entering the program) and bailout reimbursement (amount repaid, date of repayment) is obtained from the Treasury's Office of Financial Stability.

The data from these two sources is merged. Bailouts under CPP were provided to domestically controlled banks, bank holding companies, savings associations, and savings and loans holding companies. Only actual disbursed amount is considered as a fact of the bank bailout.

After outlier cleaning 550 banks were left in the sample.

3.2 Dependent variables

- **Total loans (TL) growth rate** $\Delta Ln(TL)_{it}$

  The lending activity of the banks is measured through, first of all, the growth rate (change in logarithms) of total loans (futher referred to as TL) to enterprises and individuals. The data on volumes of loans was obtained from DataStream. Table 2 presents descriptive statistics for total loans growth rates during the crisis and normal times. The annual means are reported in that table together with medians and standard deviations that are shown in brackets, respectively. Total loans growth (as well as REML and CIL growth rates) is winsorised at 1% level to remove the effect of outliers.

  Table 2 demonstrates the drop in average growth rates of lending between normal times and the crisis of 2007. Across all banks from the sample average growth rate of total loans dropped from 13.75% (10.54%)[8] in the pre-crisis period (from 1995 to 2007) to 2.49% (1.41%) during the crisis (after 2007).

  At first sight the fact of disbursement of CPP funds does not affect the growth rates much. Nevertheless, it looks like the bailed-out banks exhibited higher average loan growth rates before the crisis (14.81% (11.51%) relatively to 12.85% (9.69%), column 3, table 2) while smaller loan growth rates starting from 2008 relatively to the loan

[8]Median is reported in brackets.

Table 2: Summary statistics on growth rates of loans

Bank	1995-2011	No Crisis 1995-2007	Crisis 2008-2011
Growth rates of TL			
All banks	10.81 (8.46;16.18)	13.75 (10.54;15.96)	2.49 (1.41;13.72)
Obs	8061	5958	2103
Bailed-out banks	11.38 (9.14;16.23)	14.81 (11.51;15.73)	2.00 (0.84;13.71)
Obs	3726	2727	999
Non-bailed banks	10.33 (7.87;16.12)	12.85 (9.69;16.11)	2.94 (1.96;13.73)
Obs	4335	3231	1104
Bailed-out banks that REPAID CPP funds	11.70 (9.14;15.51)	14.63 (11.34;15.13)	3.63 (2.11;13.60)
Obs	2360	1732	628
Bailed-out banks that DID NOT REPAY CPP funds	10.81 (9.17;17.40)	15.13 (11.81;16.72)	-0.76 (-2.43;13.47)
Obs	1366	995	371
Growth rate of REML			
All banks	12.08 (8.49;24.45)	15.08 (10.94;24.75)	3.67 (1.74;21.48)
Obs	7935	5849	2086
Bailed out banks	12.37 (8.77;24.49)	15.76 (11.35;24.50)	3.17 (0.53;21.97)
Obs	3686	2693	993
Non-bailed banks	11.84 (8.26;24.42)	14.51 (10.44;24.94)	4.13 (2.36;21.02)
Obs	4249	3156	1093
Bailed-out banks that REPAID CPP funds	12.47 (8.99;24.06)	15.29 (11.26;24.25)	4.76 (2.46;21.75)
Obs	2343	1717	626
Bailed-out banks that DID NOT REPAY CPP funds	12.18 (8.38;25.23)	16.58 (11.58;24.93)	0.47 (-2.35;22.11)
Obs	1343	976	367
Growth rate of CIL			
All banks	11.79 (9.35;30.24)	15.59 (12.30;30.10)	1.40 (0.73;28.77)
Obs	7487	5482	2005
Bailed out banks	11.66 (9.81;27.49)	16.45 (13.20;27.56)	-0.93 (0.09;24.25)
Obs	3554	2575	979
Non-bailed banks	11.90 (8.93;32.58)	14.82 (11.06;32.22)	3.62 (1.41;32.54)
Obs	3933	2907	1026
Bailed-out banks that REPAID CPP funds	12.15 (9.71;25.24)	16.17 (12.77;25.79)	1.29 (1.18;21.26)
Obs	2287	1669	618
Bailed-out banks that DID NOT REPAY CPP funds	10.78 (9.93;31.23)	16.96 (14.29;30.64)	-4.71 (-4.07;28.58)
Obs	1267	906	361

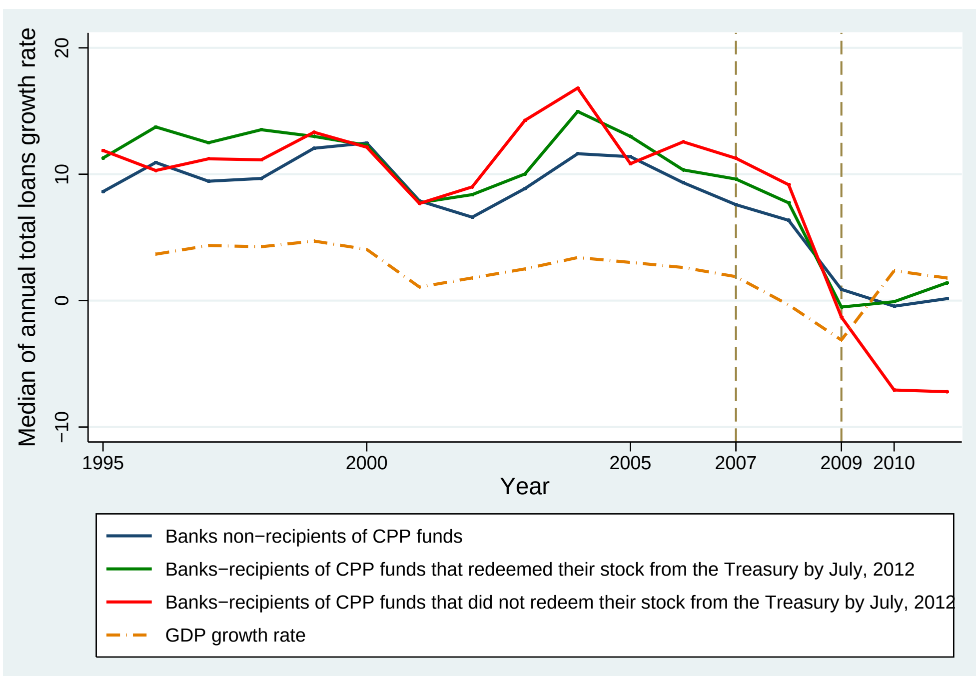
Average annual growth rates (means) are presented in table; median and standard deviation are reported in brackets.
REML stands for Real Estate Mortgage Loans; CIL stands for Commercial and Industrial Loans.

growth rates of non-bailed banks (2.00% (0.84%) relatively to 2.94% (1.96%), column 4, table 2).

Figures 1, 2 and 3 plot median TL, REML and CIL loan growth rates over time, respectively, for the banks (i) that did not receive CPP funds; (ii) that received CPP funds and repaid them totally by July 2012; (iii) that received CPP funds but did not repay anything by July 2012.

They show that bailed-out banks that did not redeem their stocks from the Treasury on average supplied more loans than other banks in the period between 2001 and 2008. Banks that did not receive CPP funds on average exhibited the lowest total loans growth rates in the period before 2008. However, the situation changed after 2008. Bank that did not repurchase their shares from the Treasury exhibited the lowest growth rates of loans, while loan growth rates started to rise at the banks that did not receive CPP funds and those that repaid their CPP funds.

Figure 1: Median annual total loans growth rates



This observation might be interpreted on a way that the banks with the highest loan growth rates before the crisis were the ones applying for the CPP funds, not repaying them and notably cutting lending during the crisis. At the same time, the banks that repurchased their stakes from the Treasury managed to restore their acitivities and to increase loan supply after 2009 (after 2010 in case of mortgage loans, table 2). Thus, it looks like the lending pattern differs significantly during the crisis between non-bailed

Figure 2: Median annual REML growth rates

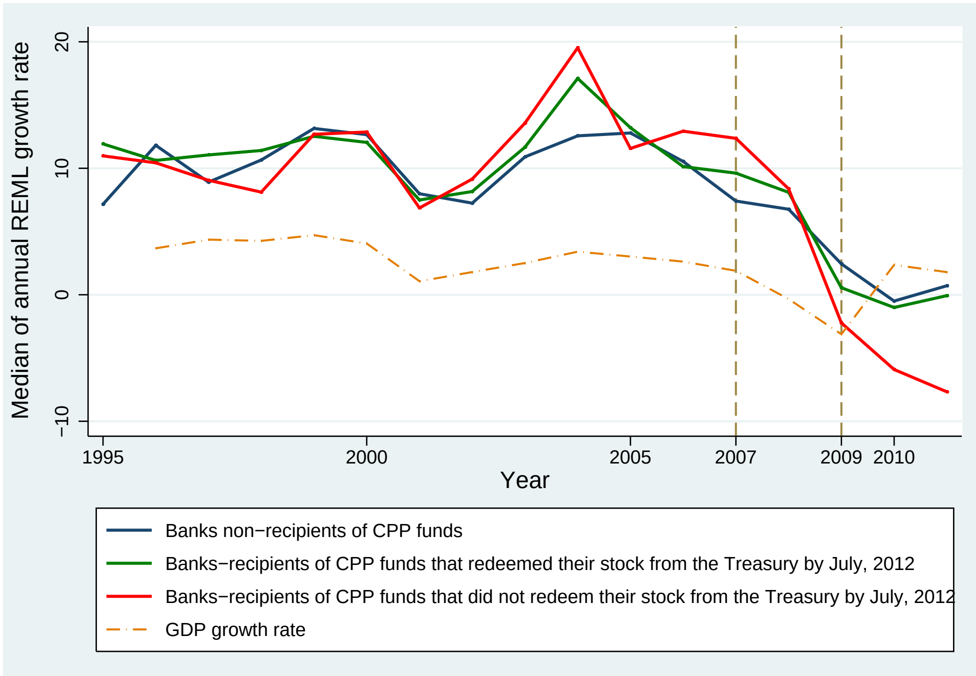
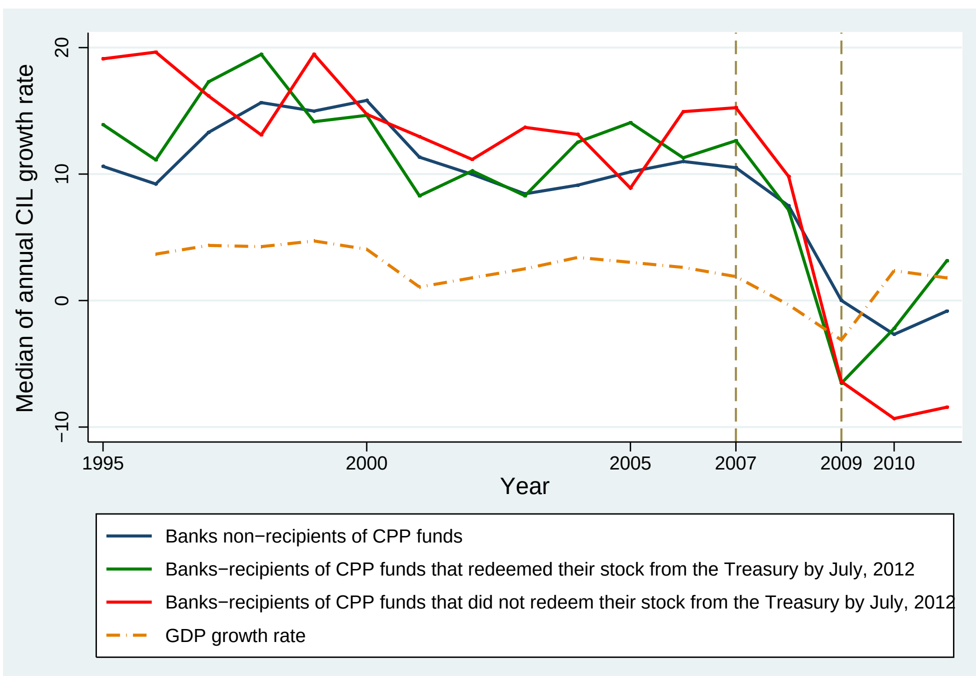


Figure 3: Median annual CIL growth rates



banks and banks that received the CPP funds and repaid them totally, and banks that did not repurchase their shares from the Treasury by July 2012.

The same trend is detected when analysing the summary statistics in table 2. The banks that did not repurchase their stakes from the U.S Treasury exhibited an average negative loan growth during the crisis period, while those that repaid the CPP funds had a positive but relatively small loan growth (-0.76% (-2.43%) compared to 3.63% (2.11%), same table).

This may be due to the fact that the banks which did not repay the CPP funds experienced larger financial problems than other banks and did not succeed in restoring their lending activity partly because they might have been constrained by the need of the future CPP funds repayment.

Overall this statistics confirms that, first of all, the lending pattern changes in a significant way for the banks that participated in the CPP program and that did not, especially when distinguishing between the pre-crisis and crisis periods.

- **Real Estate Mortgage Loans (REML) growth rate** $\Delta Ln(REML)_{it}$

  REML represent the loans made to finance construction or to purchase real estate. It includes residential, construction, commercial and other types of mortgages. The same tendencies as for the total loans growth rates can be found in the detailed statistics for the REML growth in table 2. Non-bailed banks are found to have higher average growth rates of REML during the crisis (4.12% relatively to 3.17%, table 2), which is the opposite in the pre-crisis period.

  In crisis period the average growth rate of total loans at the banks that repaid the CPP funds is more than three times smaller than in the pre-crisis period (4.76% relatively to 15.29%, same table), while it is more than thirty five times smaller for the banks that did not repay the CPP funds (0.47% relatively to 16.58%).

- **Commercial and Industrial Loans (CIL) growth rate** $\Delta Ln(CIL)_{it}$

  Commercial and Industrial Loans (further referred to as CIL) are the loans made to business and industry and include consumer, installment, financial and institutional loans. This is the group of loans that experienced the largest reduction in its growth rates during the crisis comparing to TL and REML. The CIL growth rate at bailed-out banks becomes negative. It dropped from 16.45% to -0.92% (columns 3 and 4, table 2) between the pre-crisis and crisis period. Non-bailed banks on average offered a smaller amount of credit in the pre-crisis period but substantially larger amount of CIL after 2007 (the CIL growth rate is 14.82% and 3.62%, respectively).

  This large decline in commercial and industrial lending among the bailed-out banks was due to the very low lending activity of the banks that did not repay the CPP funds.

The average CIL growth rate for them equals -4.71% in the crisis period comparing to 1.29% growth rate at the bailed-out banks that repaid CPP funds. Thus, the banks that did not provide refund to the U.S. Treasury were the banks that cut their lending the most during the crisis, especially in commercial and industrial loans (figure 3).

3.3 Individual bank-specific characteristics

3.3.1 Balance sheet characteristics

Bank balance sheet characteristics are financial statement variables that are often used to evaluate the financial situation or status of the banks. These are the variables that are often used in the literature on bank lending channel, determinants of bank's financial fragility and probability of default models such as Moody's RiskCalc v3.1 U.S. Banks model (Dwyer *et al.*, 2006). Several main indicators included in the regressions capture the level of capitalisation of the banks, their size, liquidity and overall financial health.

All individual bank-specific characteristics are demeaned. That means that the annual averages across all banks are subtracted from each bank-specific characteristics $BSC_{it} - \overline{B}SC_t$. That is done following Brei *et al.* (2011) in order the parameter estimates of Models 1 and 2 to be interpreted as the impact on the average bank. The correlation coefficients between the within-transformed dependent variables $Y_{it} - \overline{Y_i}$ and within-transformed main lagged regressors $(BSC_{it} - \overline{B}SC_i)$ as well as their interactions with dummies are presented in tables 4-6.

- **Altman's Z-score**

  Z-score indicator that represents the level of distress of each firm is calculated herein. Altman's Bankruptcy model suggests an index based on the five main financial ratios where weight of each variables defined using discriminant analysis:

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5 \tag{9}$$

  where X_1 is the ratio of difference between current assets and current liabilities to total assets; X_2 is the ratio of retained earnings to total assets; X_3 is the ratio of earnings before interest and taxes (EBIT) to total assets; X_4 is the ratio of market value of equity to total liabilities; X_5 is the ratio of sales to total assets. Higher Z-score is interpreted as an indicator of a "safer" or, in other words, more financially healthy firm, while lower Z-score indicates high level of distress of the firm (see summary statistics in table 3).

Table 3: Summary statistics

Variable	Name	Obs	Mean	Std. Dev.	Min.	Max.
Growth rate of loans						
Total loans growth, winsorised at 1%	$\Delta ln(TL)$	8061	10.81	16.18	-23.24	81.14
REML growth, winsorised at 1%	$\Delta ln(REML)$	7935	12.08	24.45	-57.08	127.25
CIL growth, winsorised at 1%	$\Delta ln(CIL)$	7487	11.79	40.24	-133.17	182.61
Balance sheet characteristics						
Altman's Z-score	Z_{it}	7079	0.30	0.13	-1.74	3.13
Capital ratio, winsorised at 1%	$\frac{TE}{TA}_{it}$	8567	10.25	4.28	3.05	31.80
MBS to total assets	$\frac{MBS}{TA}_{it}$	8225	9.38	9.82	0	74.25
TSM to total assets	$\frac{TSM}{TA}_{it}$	7504	6.78	7.26	0	58.61
Size	$Size_{it}$	8556	13.51	1.67	3.00	21.54
Individual demand sensitivity						
Sensitivity to ΔGDP per state	$Sens_{it}$	11492	10.44	22.33	-29.33	110.16
Macroeconomic conditions						
GDP growth	ΔGDP_t	10816	2.38	1.92	-3.12	4.71
Change in the Federal Funds rate	ΔINT_t	10816	-0.34	1.70	-4.58	2.00
Other control variables						
Crisis dummy	C_t	12223	0.23	0.42	0	1
Bailout dummy	B_i	11492	0.41	0.49	0	1
Repayment dummy	R_i	4726	0.61	0.49	0	1
Bailout and crisis dummy interaction	$B_i * C_t$	11492	0.10	0.29	0	1
Repayment and crisis dummy interaction	$R_i * C_t$	4726	0.14	0.35	0	1

Z-score includes information on bank's liabilities, earnings etc. That is one of the key determinants of the bank's financial stability and, thus, the credit offer by the bank. It allows to determine whether safer and more financially healthy banks supported the supply of credit in the presence of the crisis. The safer banks might exhibit a lower loan growth in normal times as they grant few risky and subprime loans. However, in the crisis period such banks might have an easier access to external financing as they possess a better collateral[9] and exhibit a greater probability to satisfy the capital requirements.

- **Capital ratio**

  The level of capitalisation of each bank is measured through the equity to total assets ratio. This ratio is the most broad measure of bank capital. It is preferred to total capital and tier one-based capital ratios due to the data availability (there is less information on risk-weighted assets than on total assets).

  Besides, adequacy ratios are the targeted capital ratios due to the bank capital requirements. Thus, banks tend to adjust their level of exposure to risky assets which in large part is based on altering the composition of the bank's loan portfolio. In that case the probability of endogeneity between the capital ratio and dependent variable is rising, making it more difficult to obtain the unbiased parameter estimates.

  The equity-to-assets ratio is winsorised at 1% level. After winsorization procedure the average capital ratio is around 10.25% (table 3). It is expected that better capitalised banks provide more loans during hard times (crisis period). Indeed, the correlation between the growth rates of total loans and captial ratio is postive (0.13, table 4). Moreover, more capitalised banks, in case they were bailed out, are expected to exhibit higher loan growth rates than non-bailed banks.

- **Size**

  Bank size is measured as a logarithm of the bank's total assets. On one hand, larger banks tend to be more resilient to shocks as they own a more diversified portfolio of assets. Besides, larger banks might be less sensitive to the changes in credit demand and withdrawal of deposits as they are considered "too big to fail". By the same token larger banks receive more support in terms of recapitalisation funds (see Isyuk, 2013a). On the other hand, the losses of larger banks might be more significant than

[9] That argument is in line with the logics of Kiyotaki and Moore (1997) model where they highlight the role of collateral for the access to credit market.

Table 4: Correlation coefficients for within-transformed dependent and main explanatory variables with no interactions

Var	Δln $(TL)_{it}$	Δln $(REML)_{it}$	Δln $(CIL)_{it}$	Δln $(TL)_{it-1}$	Δln $(REML)_{it-1}$	Δln $(CIL)_{it-1}$	Z_{it-1}	$\frac{TE}{TA}{}_{it-1}$	$Size_{it-1}$	$\frac{MBS}{TA}{}_{it-1}$	$\frac{TSM}{TA}{}_{it-1}$	$Sens_{it-1}$	C_t	B_i	B_iC_t	R_i	R_iC_t	GDP_{t-1}	FF_{t-1}	$Beta$
$\Delta ln(TL)_{it}$	1.00																			
Δln $(REML)_{it}$	0.67	1.00																		
Δln $(CIL)_{it}$	0.35	-0.10	1.00																	
Δln $(TL)_{it-1}$	0.44	0.31	0.13	1.00																
Δln $(REML)_{it-1}$	0.30	0.14	0.13	0.68	1.00															
Δln $(CIL)_{it-1}$	0.19	0.17	-0.01	0.36	-0.08	1.00														
Z_{it-1}	0.28	0.20	0.13	0.16	0.11	0.09	1.00													
$\frac{TE}{TA}{}_{it-1}$	0.13	0.08	0.09	0.02	0.02	0.06	0.48	1.00												
$Size_{it-1}$	-0.30	-0.20	-0.15	-0.14	-0.08	-0.10	-0.23	-0.13	1.00											
$\frac{MBS}{TA}{}_{it-1}$	-0.03	-0.03	-0.00	-0.14	-0.08	-0.05	-0.10	-0.01	0.14	1.00										
$\frac{TSM}{TA}{}_{it-1}$	0.13	0.09	0.06	0.09	0.05	0.05	0.10	-0.00	-0.26	-0.24	1.00									
$Sens_{it-1}$	0.26	0.15	0.14	0.22	0.15	0.12	0.21	0.17	-0.29	-0.06	0.05	1.00								
C_t	-0.23	-0.14	-0.12	-0.11	-0.07	-0.07	-0.13	-0.04	0.42	-0.03	-0.15	-0.38	1.00							
B_i	0.05	0.01	0.03	0.04	0.02	-0.00	-0.01	0.01	0.06	-0.16	-0.04	-0.08	0.00	1.00						
B_iC_t	-0.13	-0.07	-0.08	-0.05	-0.03	-0.06	-0.13	-0.02	0.34	-0.05	-0.12	-0.25	0.64	0.44	1.00					
R_i	0.06	0.02	0.05	0.03	0.00	0.01	-0.02	0.04	0.05	0.02	-0.05	0.02	-0.03	**0.70**	0.27	1.00				
R_iC_t	-0.09	-0.05	-0.05	-0.05	-0.03	-0.04	-0.10	0.03	0.28	-0.03	-0.11	-0.17	0.48	0.33	**0.76**	0.48	1.00			
GDP_{t-1}	0.32	0.20	0.16	0.25	0.15	0.14	0.31	0.10	-0.41	-0.11	0.17	0.38	-0.62	-0.01	-0.41	0.02	-0.32	1.00		
FF_{t-1}	0.23	0.14	0.11	0.20	0.11	0.12	0.28	0.06	-0.15	-0.11	0.08	0.50	-0.38	-0.01	-0.26	-0.00	-0.20	**0.84**	1.00	
$Beta_{i,2002-2}$	0.00	0.00	0.01	-0.01	-0.01	-0.01	0.00	0.07	0.41	-0.05	-0.10	0.09	-0.05	0.32	0.10	0.37	0.16	0.05	0.04	1.00

This table reports the correlation coefficients for within-transformed variables.

The correlation coefficients between dependent and explanatory variables smaller than 0.1 in their absolute values are highlighted in grey.

those of smaller banks during the crisis due to their greater exposure to the market of derivatives.

- **Mortgage-Backed Securities (MBS)**

  There are two proxies for the level of liquidity that are considered in this model. Both are included in the liquidity indicator proposed by the Moody's RiskCalc v3.1 U.S. Banks model (Dwyer *et al.*, 2006). However, here it is suggested to distinguish between mortgage-backed securities and treasury and municipal securities due to their different positions during the recent crisis.

  Moody's RiskCalc v3.1 U.S. Banks model (Dwyer *et al.*, 2006) and Basel II regulation classified mortgage-backed securities (MBS) as safe and liquid holdings. That was indeed the case at the time, MBSs also included government mortgages provided by Government National Mortgage Association or other U.S. Federal agencies. In normal times MBS were highly liquid assets that were widely traded, while with accelerating speed of subprime defaults and consequential foreclosures significant part of them became highly risky or even "toxic".

  Mortgage-backed securities in levels are normalised by total assets and are expected to positively affect loan growth rates before 2008 but negatively during the crisis. After 2008 MBS are expected to become a financial burden on the balance sheet of the banks that might lead to the scarce credit offer by such banks.

  The correlation tables 4, 5 and 6, however, suggest only a weak correlation between the share of MBS in total assets and loan growth rates (-0.03, table 4). Thus, when choosing between MBS and the share of Treasury securities in the bank portfolio, the latter one is selected for the inclusion in final regressions.

- **Treasury and Municipal Securities (TSM)** include the loans made to federal, state and/or municipal government. As they represent the government debt issued by the U.S. Treasury, that type of securities remained the most liquid and secure during the crisis. The "flight to security" that occurred due to the turbulence at the financial markets only strengthened the position of government-issued debt. Thus, the banks with larger amounts of Treasury and municipal securities in their asset portfolios had stronger and more liquid positions during the crisis, that could be translated into the more intensive lending activity. The correlation coefficients from tables 4, 5 and 6 between dependent variables and the shares of Treasury securities confirm that argument. Correlation with growth rates of total loans reaches 0.13 in normal times, 0.15 in crisis period and 0.11 for the bailed-out banks (tables 4, 5 and 6 respectively).

Table 5: Correlation coefficients for within-transformed dependent and main explanatory variables interacted with crisis dummy

Var	$\Delta ln\ (TL)_{it}$	$\Delta ln\ (REML)_{it}$	$\Delta ln\ (CIL)_{it}$	$Z_{it-1} * C$	$\frac{TE}{TA}_{it-1} * C$	$Size_{it-1} * C$	$\frac{MBS}{TA}_{it-1} * C$	$\frac{TSM}{TA}_{it-1} * C$	$Sens_{it-1} * C$	C_t	B_i	B_iC_t	R_i	R_iC_t	GDP_{t-1}	FF_{t-1}
$\Delta ln\ (TL)_{it}$	1.00															
$\Delta ln\ (REML)_{it}$	0.68	1.00														
$\Delta ln\ (CIL)_{it}$	0.37	-0.07	1.00													
$Z_{it-1} * C$	0.25	0.18	0.11	1.00												
$\frac{TE}{TA}_{it-1} * C$	0.13	0.08	0.09	0.49	1.00											
$Size_{it-1} * C$	-0.28	-0.20	-0.14	-0.29	-0.07	1.00										
$\frac{MBS}{TA}_{it-1} * C$	-0.04	-0.05	-0.00	-0.12	0.02	0.13	1.00									
$\frac{TSM}{TA}_{it-1} * C$	0.15	0.10	0.07	0.17	-0.07	-0.38	-0.23	1.00								
$Sens_{it-1} * C$	0.21	0.12	0.12	0.21	0.23	-0.38	-0.04	0.09	1.00							
C_t	-0.23	-0.14	-0.12	-0.09	-0.07	0.46	0.00	-0.28	-0.37	1.00						
B_i	0.04	0.01	0.02	-0.06	0.03	0.09	-0.01	-0.04	-0.01	0.01	1.00					
B_iC_t	-0.13	-0.07	-0.09	-0.12	-0.02	0.37	-0.03	-0.21	-0.25	0.64	0.44	1.00				
R_i	0.05	0.02	0.03	-0.02	0.10	0.06	-0.01	-0.04	0.02	-0.02	**0.70**	0.27	1.00			
R_iC_t	-0.09	-0.05	-0.06	-0.09	0.05	0.31	-0.03	-0.18	-0.16	0.49	0.33	**0.76**	0.48	1.00		
GDP_{t-1}	0.31	0.20	0.16	0.30	0.10	-0.52	-0.10	0.29	0.49	-0.62	-0.01	-0.41	0.01	-0.32	1.00	
FF_{t-1}	0.22	0.13	0.11	0.29	0.09	-0.39	-0.10	0.21	0.46	-0.38	-0.01	-0.26	-0.00	-0.20	**0.84**	1.00

The correlation coefficients between dependent and explanatory variables smaller than 0.1 in their absolute values are highlighted in grey.

Table 6: Correlation coefficients for within-transformed dependent and main explanatory variables interacted with bailout dummy

Var	$\Delta ln (TL)_{it}$	$\Delta ln (REML)_{it}$	$\Delta ln (CIL)_{it}$	$Z_{it-1} * B$	$\frac{TE}{TA}_{it-1} * B$	$Size_{it-1} * B$	$\frac{MBS}{TA}_{it-1} * B$	$\frac{TSM}{TA}_{it-1} * B$	$Sens_{it-1} * B$	C_t	B_i	B_iC_t	R_i	R_iC_t	GDP_{t-1}	FF_{t-1}
$\Delta ln (TL)_{it}$	1.00															
$\Delta ln (REML)_{it}$	0.68	1.00														
$\Delta ln (CIL)_{it}$	0.37	-0.07	1.00													
$Z_{it-1} * B$	0.22	0.16	0.10	1.00												
$\frac{TE}{TA}_{it-1} * B$	0.10	0.06	0.08	0.46	1.00											
$Size_{it-1} * B$	-0.24	-0.16	-0.11	-0.24	-0.07	1.00										
$\frac{MBS}{TA}_{it-1} * B$	-0.02	-0.02	0.00	-0.14	-0.02	0.13	1.00									
$\frac{TSM}{TA}_{it-1} * B$	0.11	0.07	0.04	0.15	0.05	-0.38	-0.22	1.00								
$Sens_{it-1} * B$	0.19	0.10	0.11	0.23	0.12	-0.32	-0.04	0.10	1.00							
C_t	-0.23	-0.14	-0.12	-0.13	-0.03	0.30	-0.06	-0.12	-0.28	1.00						
B_i	0.04	0.00	0.02	0.05	-0.02	0.32	0.01	-0.24	-0.11	0.00	1.00					
B_iC_t	-0.13	-0.07	-0.09	-0.15	-0.05	0.52	-0.07	-0.25	-0.40	0.64	0.44	1.00				
R_i	0.05	0.02	0.03	0.02	0.03	0.25	0.02	-0.20	-0.05	-0.02	**0.70**	0.27	1.00			
R_iC_t	-0.09	-0.05	-0.06	-0.11	0.03	0.42	-0.05	-0.22	-0.28	0.49	0.33	**0.76**	0.48	1.00		
GDP_{t-1}	0.31	0.20	0.16	0.26	0.04	-0.30	-0.07	0.13	0.44	-0.62	-0.01	-0.41	0.01	-0.32	1.00	
FF_{t-1}	0.22	0.13	0.11	0.22	0.00	-0.12	-0.08	0.05	0.38	-0.38	-0.01	-0.26	-0.00	-0.20	**0.84**	1.00

The correlation coefficients between dependent and explanatory variables smaller than 0.1 in their absolute values are highlighted in grey.

3.3.2 Sensitivity to demand shock on bank products

Most of the literature on bank lending including Brei *et al.* (2011); Berrospide and Edge (2010) focuses on the financial determinants of the bank credit supply. Demand factors are mostly captured via inclusion of the GDP growth rate, inflation and interest rates and other aggregate macroeconomic characteristics. In this article one of the core determinants of the credit supply are heterogeneous reactions of financial institutions to the shock on aggregate demand. These individual bank sensitivities allow to gauge the impact of decline in demand for credits on the bank loan growth.

First the cross-sectional demand sensitivities are constructed following Claessens *et al.* (2012). Each bank's net income growth is regressed on the change in real GDP of the state where the bank is headquartered (in the period between 1990 and 2006):

$$\Delta NI_{i,1990-2006} = \alpha_i + \beta_i \Delta \ln(RGDP_{ST,1990-2006}) + \epsilon_{i,1990-2006} \tag{10}$$

where $\beta_i = \epsilon_{GDP} = \epsilon_{\frac{\Delta NI_{i,1990-2006}}{\Delta RGDP_{ST,1990-2006}}}$ is the slope or sensitivity of change in bank's net income to real GDP growth in the state where the bank is headquartered. The alternative measure of this index contains the data on personal income instead of real GDP.

The idea beyond the first step is to estimate the impact of an increase in real GDP on bank revenues during 16 years prior to crisis. Secondly, the cross-sectional sensitivity is converted into individual bank sensitivity by multiplying the β_i[10] estimated from Equation 10 by annual real GDP growth of the state where the bank is headquartered $\Delta \ln(GDP_{ST,t})$.

The correlation coefficients from table 4 confirm that sensitivity to demand shock is highly and positively correlated with growth rates of TL, REML and CIL (the coefficients are 0.26, 0.15 and 0.14, respectively, table 4).

3.4 Dummies and macroeconomic variables

- **Dummies**

  - *Crisis dummy* is the dummy that takes on a value of 1 in the period from 2008 until 2011. It is longer than the conventional view on the crisis mostly suggests (between 2008-2009). Nevertheless, here the period is extended in order to capture the post-crisis period with sluggish economic growth during which the banks were supposed to recover and to support the credit offer to enterprises and individuals.

    Each bank-specific variable is interacted with the crisis dummy and both bailout

[10] β_i basically represents the change in net income of the bank when GDP rises by one unit.

and crisis dummy (or repayment and crisis dummy for Model 2). The dummy itself and its interactions with other dummies are also included in the regressions.

  - *Bailout dummy* is the dummy that takes on two values, 0 and 1 (see table 2) to distinguish between the banks that did not receive CPP funds and those that did. Banks that have finally received CPP funds applied for Capital Purchase Program (CPP), have been approved for funding and then accepted the funds. Out of around 600 banks in the sample approximately 318 banks did not receive the CPP funds, while around 278 banks did.
  - *Repayment dummy* is the binary variable that is equal to 1 if the bailed-out bank had repurchased its stake from the U.S. Treasury by July 2012; 0 otherwise. Regressions with repayment dummy and interactions of the bank-specific variables with that dummy are only run on the limited sample of bailed-out banks. 169 banks out of 278 banks (more than 60%) which received the CPP funds have reimbursed it by July 2012.

- **Macroeconomic variables**
  - *Real annual GDP growth* accounts for time-fixed effects in the sample. The lending activity of the banks is expected to expand in the years with higher rates of production growth reflecting increasing population wealth and improvement of the state of economy in general.
  - *Change in 3-months London Interbank Overnight Rate (LIBOR)* reflects the tendencies and changes in macroeconomic policies that are spilled over to the interbank markets. It is a principal component of the bank lending channel literature that discusses the short-term effects of monetary policies on the changes in bank lending. Banks borrowing from the central bank or from the interbank markets, in case of abundant capital and low interest rates, tend to lower the interest rates on credits that in turn leads to higher investments and more intensive bank lending activity. The effect is the opposite in case of a rise of the interest rates.

However, these two macroeconomic variables cannot be included simultaneously in the regressions due to the high correlation between them (it reaches 0.84, table 4). That correlation arises due to the countercyclical nature of monetary policy: the central bank tends to increase the interest rates in the periods of intensive growth and to lower the interest rates during the recession. Hence, most of the regressions are conducted including only GDP growth.

4 Results

4.1 Mundlak-Krishnakumar Estimator

In this section Models 1 and 2 are estimated using Mundlak-Krishnakumar estimator. It allows, first of all, to obtain the estimators for time-invariant variables (such as bailout dummy and repayment dummy) and, second, to distinguish between endogenous and exogenous variables through the estimated parameters $\widehat{\beta_B} - \widehat{\beta_W}$ (see Equation 7).

Results for two groups of regressions 1 and 2 with robust standard errors are reported in tables 7 and 8 respectively. Recall that the first group of regressions is run on the full sample of banks and distinguishes between bailed-out and non-bailed banks in normal and crisis times. The second group of regressions is run on the subsample of bailed-out banks separating the banks that repaid CPP funds and from those that did not pay anything by July, 2012, both in crisis and normal times.

Variables for which the estimated parameter $\widehat{\beta_B} - \widehat{\beta_W}$ (thus, coefficient for respective means of the variables) is small and t-statistic is close to zero (here parameters with t-statistic smaller than one are chosen) are highlighted in gray in tables 7 and 8 and used then as instrumental variables in Hausman and Taylor (1981) model.

In general the coefficients for main variables as well as for interactions of main variables with crisis dummy reported in both tables 7 and 8 are less significant than those obtained in fixed effect regression in the previous section. However, the signs of the coefficients remain similar.

Table 7: Mundlak-Krishnakumar Estimator - The effects of CPP funds disbursement and crisis on bank lending activity (without autoregressive component)

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
Individual bank characteristics: non-bailed banks, normal times (δ)						
Z_{it-1}	-0.94	-0.93	-1.82*	-1.62	1.34	1.34
	(-1.20)	(-1.28)	(-1.65)	(-1.60)	(0.80)	(0.76)
$\frac{TE}{TA}_{it-1}$	3.65***	4.17***	4.51***	5.11***	7.09***	7.82***
	(5.55)	(6.15)	(4.72)	(5.18)	(3.55)	(3.86)
$\frac{TSM}{TA}_{it-1}$	0.28	0.56	0.14	0.35	0.98	1.40
	(0.59)	(1.18)	(0.19)	(0.55)	(0.87)	(1.13)
$Size_{it-1}$	-19.38***	-18.53***	-19.52***	-18.38***	-18.07***	-18.14***
	(8.63)	(8.62)	(5.92)	(5.76)	(3.74)	(3.49)
$Sens_{it-1}$	4.08***	4.08***	3.87**	3.65**	5.37**	5.16**
	(4.63)	(4.87)	(2.33)	(2.36)	(2.07)	(1.98)
Individual bank characteristics: non-bailed banks, crisis (δ^*, $\delta + \delta^*$ in square brackets)						
$Z_{it-1} * C_t$	4.72*** [**3.78**]	3.74*** [**2.81**]	6.32*** [**4.51**]	5.41*** [**3.78**]	-0.39 [**0.95**]	-0.99 [**0.36**]
	(3.75)	(3.02)	(3.31)	(2.93)	(-0.11)	(-0.28)
$\frac{TE}{TA}_{it-1} * C_t$	-0.21 [**3.44**]	0.82 [**4.98**]	-1.80 [**2.71**]	-0.86[**4.25**]	7.39* [**14.48**]	8.08* [**15.90**]
	(-0.13)	(0.54)	(-0.85)	(-0.41)	(1.67)	(1.86)
$\frac{TSM}{TA}_{it-1} * C_t$	1.54* [**1.82**]	0.91 [**1.47**]	0.91 [**1.05**]	0.28 [**0.63**]	2.10 [**3.08**]	1.40 [**2.80**]

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Table 7 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
	(1.89)	(1.11)	(0.78)	(0.24)	(0.82)	(0.54)
$Size_{it-1} * C_t$	-1.61* [**-20.99**]	-0.94 [**-19.47**]	-3.53***[**-23.06**]	-2.91**[**-21.30**]	1.45 [**-16.63**]	1.95 [**-16.19**]
	(-1.70)	(-0.97)	(-2.67)	(-2.17)	(0.54)	(0.73)
$Sens_{it-1} * C_t$	-3.01**[**1.07**]	-2.36* [**1.72**]	-4.08* [**-0.21**]	-3.44 [**0.21**]	1.72 [**7.09**]	2.15 [**7.31**]
	(-2.19)	(-1.74)	(-1.86)	(-1.63)	(0.38)	(0.49)
Individual bank characteristics: bailed-out banks, normal times (ω, $\delta + \omega$ **in square brackets)**						
$Z_{it-1} * B_i$	1.56 [**0.62**]	0.50 [**0.58**]	3.32** [**1.51**]	3.18* [**1.56**]	0.16 [**1.50**]	-0.07 [**1.27**]
	(1.29)	(1.25)	(1.97)	(1.89)	(0.06)	(-0.02)
$\frac{TE}{TA}_{it-1} * B_i$	-1.03 [**2.62**]	-2.36** [**1.80**]	-3.22** [**1.29**]	-4.73***[**0.39**]	0.43*[**7.52**]	-0.99 [**6.83**]
	(-1.01)	(-2.22)	(-1.98)	(-2.72)	(0.15)	(-0.33)
$\frac{TSM}{TA}_{it-1} * B_i$	1.12* [**1.40**]	0.91 [**1.47**]	1.68* [**1.82**]	1.47 [**1.82**]	-2.52 [**-1.54**]	-3.01 [**-1.61**]
	(1.66)	(1.37)	(1.78)	(1.50)	(-1.41)	(-1.61)
$Size_{it-1} * B_i$	-1.94 [**-21.31**]	-3.21 [**-21.74**]	-2.69 [**-22.21**]	-3.08 [**-21.46**]	1.43 [**-16.64**]	0.70 [**-17.44**]
	(-0.75)	(-1.22)	(-0.70)	(-0.79)	(0.25)	(0.11)
$Sens_{it-1} * B_i$	1.72 [**5.80**]	1.50 [**5.59**]	1.29 [**5.16**]	1.29 [**4.94**]	-0.43 [**4.94**]	-0.64 [**4.51**]
	(1.33)	(1.20)	(0.56)	(0.57)	(-0.12)	(-0.17)
Individual bank characteristics: bailed-out banks, crisis (ω^*, $\delta + \delta^* + \omega + \omega^*$ **in square brackets)**						
$Z_{it-1} * B_i * C_t$	-2.12 [**3.22**]	-0.78 [**3.53**]	-1.71 [**6.12**]	-0.42 [**6.54**]	-1.56 [**-0.44**]	-0.83 [**-0.55**]
	(-1.27)	(-0.46)	(-0.68)	(-0.17)	(-0.37)	(-0.20)
$\frac{TE}{TA}_{it-1} * B_i * C_t$	2.36 [**4.77**]	2.62* [**5.24**]	3.65 [**3.14**]	3.74 [**3.27**]	-4.00 [**10.91**]	-3.09 [**11.82**]
	(1.08)	(1.20)	(1.16)	(1.21)	(-0.69)	(-0.54)
$\frac{TSM}{TA}_{it-1}$ $B_i * C_t$	-1.75 [**1.19**]	-0.70 [**1.68**]	-3.43** [**-0.70**]	-2.31 [**-0.21**]	1.40 [**1.96**]	2.52 [**2.31**]
	(-1.57)	(-0.69)	(-1.90)	(-1.23)	(0.11)	(0.43)
$Size_{it-1} * B_i * C_t$	-0.12 [**-22.64**]	-1.29 [**-23.99**]	0.02 [**-25.01**]	-1.19 [**-25.75**]	-1.40 [**-16.74**]	-3.12 [**-19.19**]
	(0.49)	(-0.81)	(0.24)	(-0.54)	(-0.25)	(-0.68)
$Sens_{it-1} * B_i * C_t$	-2.58 [**0.21**]	-2.58 [**0.64**]	-1.29 [**-0.21**]	-1.50 [**0.00**]	-6.02 [**0.64**]	-6.45 [**0.21**]
	(-1.46)	(-1.38)	(-0.49)	(-0.58)	(-1.14)	(-1.16)
Macroeconomic conditions						
C_t	-11.24***	-7.77***	-13.08***	-9.03***	-8.57***	-6.31***
	(-11.03)	(-10.17)	(-7.99)	(-8.54)	(-2.70)	(-3.05)
B_i	1.07	1.21*	-0.26	-0.12	2.85**	2.59*
	(1.57)	(1.73)	(-0.30)	(-0.14)	(2.07)	(1.81)
$B_i * C_t$	1.45	1.05	3.26**	2.78**	-2.74	-2.61
	(1.57)	(1.10)	(2.48)	(2.09)	(-1.08)	(-1.02)
ΔGDP_{t-1}		1.23***		1.05***		1.83***
		(12.14)		(5.08)		(4.99)
Means						
Mean Z_{it-1}	-48.79***	-43.71***	-50.90***	-48.53***	-69.21***	-65.96**
	(-4.31)	(-3.36)	(-4.11)	(-3.67)	(-2.86)	(-2.55)
Mean $\frac{TE}{TA}_{it-1}$	-0.06	-0.22	-0.17	-0.33	0.16	-0.02
	(-0.19)	(-0.66)	(-0.49)	(-0.92)	(0.25)	(-0.04)
Mean $Size_{it-1}$	12.13***	11.49***	11.37***	10.68***	11.59***	11.51***
	(8.63)	(8.62)	(5.92)	(5.76)	(3.74)	(3.49)
$\frac{TSM}{TA}_{it-1}$	-0.14	-0.17	-0.07	-0.10	-0.48**	-0.54**
	(-1.19)	(-1.42)	(-0.45)	(-0.69)	(-2.33)	(-2.57)
Mean $Sens_{it-1}$	-0.08	-0.07	0.05	0.06	-0.28*	-0.27*
	(-1.29)	(-1.08)	(0.57)	(0.71)	(-1.92)	(-1.80)
Mean $Z_{it-1} * C_t$	7.87	4.35	9.58	7.80	35.12	31.06
	(0.45)	(0.24)	(0.46)	(0.38)	(1.04)	(0.89)
Mean $\frac{TE}{TA}_{it-1} * C_t$	2.52***	2.18**	2.52**	2.11*	-0.38	-0.60
	(2.73)	(2.35)	(2.28)	(1.92)	(-0.18)	(-0.28)
Mean $Size_{it-1} * C_t$	2.56	3.25	6.34	6.15	3.74	4.53
	(0.94)	(1.19)	(1.62)	(1.58)	(0.61)	(0.73)
Mean $\frac{TSM}{TA}_{it-1} * C_t$	-0.77	-0.63	-0.44	-0.23	-1.44	-1.26
	(-1.63)	(-1.34)	(-0.74)	(-0.38)	(-1.55)	(-1.34)
Mean	1.38	1.27	-1.41	-1.51	1.91	1.82

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Table 7 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
$Sens_{it-1} * C_t$	(1.27)	(1.15)	(-1.13)	(-1.19)	(0.75)	(0.67)
Mean	7.73	2.93	-0.62	-4.51	46.67	49.33
$Z_{it-1} * B_i$	(0.48)	(0.17)	(-0.03)	(-0.23)	(1.45)	(1.46)
Mean	0.45	0.82	0.98*	1.39**	-0.24	0.01
$\frac{TE}{TA}_{it-1} * B_i$	(0.91)	(1.63)	(1.69)	(2.31)	(-0.27)	(0.01)
Mean	-0.03	0.95	0.53	1.03	-3.72	-3.08
$Size_{it-1} * B_i$	(-0.02)	(0.50)	(0.20)	(0.39)	(-1.01)	(-0.77)
Mean	0.18	0.18	0.07	0.09	0.57*	0.63**
$\frac{TSM}{TA}_{it-1} * B_i$	(1.15)	(1.09)	(0.35)	(0.45)	(1.81)	(1.97)
Mean	0.02	0.02	-0.08	-0.09	0.15	0.16
$Sens_{it-1} * B_i$	(0.32)	(0.23)	(-0.69)	(-0.80)	(0.88)	(0.90)
Mean	26.44	30.05	-0.01	4.24	31.52	33.56
$Z_{it-1} * B_i * C_t$	(0.80)	(0.91)	(-0.00)	(0.10)	(0.64)	(0.67)
Mean	-3.81**	-4.09***	-3.58**	-3.74**	-1.57	-1.89
$\frac{TE}{TA}_{it-1} * B_i * C_t$	(-2.54)	(-2.78)	(-2.02)	(-2.14)	(-0.54)	(-0.64)
Mean	3.88	3.89	6.35	6.05	8.00	7.64
$Size_{it-1} * B_i * C_t$	(0.90)	(0.88)	(1.06)	(1.01)	(1.00)	(0.93)
Mean	-1.88**	-2.03**	-1.66*	-1.98**	-0.68	-0.94
$\frac{TSM}{TA}_{it-1} * B_i * C_t$	(-2.26)	(-2.46)	(-1.70)	(-1.99)	(-0.50)	(-0.68)
Mean	-0.17	-0.09	2.91	2.97	0.10	0.28
$Sens_{it-1} * B_i * C_t$	(-0.11)	(-0.06)	(1.52)	(1.49)	(0.04)	(0.09)
Constant	11.03***	9.87***	13.33***	12.08***	11.07***	9.14***
	(16.29)	(15.73)	(12.86)	(13.62)	(5.99)	(6.24)
Overall R^2	0.35	0.32	0.18	0.15	0.11	0.10
Obs	5637	5495	5619	5478	5344	5218

Notes: t-statistics in parentheses; ***, ** and* denote p-value less than 0.1%, 1% and 5% respectively.

In normal times higher capitalisation of the bank is associated with higher growth rates of lending both for non-bailed and bailed-out banks. A one percentage point increase in the bank capital ratio leads to a 3.6-4.2% increase (columns 2 and 3, section "non-bailed banks, normal times", table 7) in total lending for non-bailed banks and to a 1.8-2.6% rise (columns 2 and 3, section "bailed-out banks, normal times", table 7) in total lending for bailed-out banks.

During the crisis more capitalised bailed-out banks tend to increase lending to a slightly larger extent than non-bailed banks. A one percentage point increase in bank capital is associated with a 4.8-5.2% faster total loans growth (columns 2 and 3, section "bailed-out banks, crisis", table 7) for the average bailed-out bank during the crisis comparing to that of 3.4-5.0% (columns 2 and 3, section "non-bailed banks, crisis", table 7) for the average non-bailed bank.

The same pattern is recognised for the growth rates of mortgage and commercial and industrial lending. During the crisis non-bailed banks tend to increase mortgage lending by 2.7-4.2% (columns 4 and 5, section "non-bailed banks, crisis", table 7) with one percentage point rise in bank capital ratio relative to a 4.5-5.1% rise (columns 4 and 5, section "non-bailed banks, normal times", table 7) in normal times. During the crisis bailed-out banks increase mortgage lending by 3.1-3.3% (columns 4 and 5, section "bailed-out banks, crisis", table 7) with one percentage point rise in bank's level of capitalisation comparing to a 0.4-1.3% rise (columns 4 and 5, section "bailed-out banks, normal times", table 7) in normal times.

Results also suggest that in the period before 2007 bailed-out banks are reluctant to translate additional capital into new mortgage loans preferring instead to support commercial and industrial lending. Recall that in Isyuk, 2013a it was found that the growth rates of real estate mortgage loans are highly and negatively correlated to the growth rates of commercial and industrial loans. This fact was interpreted as a "specialisation" of the bank according to the dominant loan types in the bank's portfolio. That interpretation suggests that during the crisis the banks specialised in commercial and industrial lending with an additional unit of capital tend to offer more loans than the banks specialised in mortgage lending. Moreover, it also shows that obtained results are in line with those from Isyuk, 2013a. In the latter one it was reported that banks that specialised in commercial and industrial loans were more likely to be bailed out, while at the same time they tended to exhibit a higher probability of repurchasing their shares from the Treasury than other banks. In that sense it is not surprising that these banks were more likely to expand the lines of commercial and industrial loans.

Demand factor has a positive impact on growth rates of loans in normal times, while it almost totally disappears for the bailed-out banks during the crisis. A one point increase in sensitivity to demand shock leads to a 4.1% (columns 2 and 3, section "non-bailed banks, normal times", table 7) faster total loans growth for non-bailed banks in normal times relatively to a 1.1-1.7% rise (columns 2 and 3, section "non-bailed banks, crisis", table 7) during the crisis. The same increase in demand sensitivity for bailed-out banks is associated with a 5.6-5.8% rise (columns 2 and 3, section "bailed-out banks, normal times", table 7) in total lending in normal times, while only with a 0.2-0.6% increase in growth rates of total loans during the crisis (columns 2 and 3, section "bailed-out banks, crisis", table 7).

This result means that while more capitalised bailed-out banks exhibited higher growth rates of loans, demand for loans at bailed-out banks declined more that that at non-bailed banks. The explanation may be related to the unwillingness of the borrowers to take loans at bailed-out banks. It can be due to the expectations of CPP funds repayments and uncertainty concerning the bank's future. It seems that the fact of the bank's bailout (especially for smaller banks) was considered by the borrowers a bad sign regarding the bank's financial situation, and they preferred to get their credits at other banks.

Similar to the results of fixed effects regression, size of the bank has a negative impact on credit offer. Larger banks provide less loans in normal times and this effect is amplified during the crisis.

When analysing separately the banks that repaid CPP funds and the banks that did not repay anything by July 2012, it looks like well capitalised banks that did not repay CPP funds lend more than the banks that repaid CPP funds, both in normal times and during the crisis. Banks that did not repurchase their stakes from the U.S. Treasury by July 2012 increase their lending by 2.1-2.6% (columns 2 and 3, section "bank that did not repay CPP funds, normal times", table 8) in normal times and by 4.8-6.1% (columns 2 and 3, section "bank that did not repay CPP funds, crisis", table 8) during the crisis with one percentage point increase in capital ratio. Banks that repaid CPP funds with one percentage point increase in capitalisation raise their total lending by 0.9-1.4% (columns 2 and 3, section "bank that repaid CPP funds, normal times", table 8) in normal times compared to 2.4-3% (columns 2 and 3, section "bank that repaid CPP funds, crisis", table 8) during the crisis. The same trend is found for mortgage and commercial loans growth rates.

Drop in consumer's demand has a negative impact on growth rates of loans, especially during the crisis. For the average bank that repaid CPP funds a one point increase in sensitivity to demand shock leads to a 0.2-0.4% (columns 2 and 3, section "bank that repaid CPP funds, crisis", table 8) lower growth rate of total lending during the crisis and to a 3.9-4.5% (columns 4 and 5, section "bank that repaid CPP funds, crisis", table 8) lower growth rates of mortgage lending. For the banks that did not repurchase their stakes from the Treasury the impact of demand factor is also smaller comparing to normal times but it stays overall positive (except for the growth rates of commercial and industrial loans). A one percentage point increase in the sensitivity to demand shock leads to a 3.9% (columns 2 and 3, section "bank that did not repay CPP funds, normal times", table 8) rise of total loans growth at the average bank that did not repay CPP funds in normal times and to a 0.2-0.4% (columns 2 and 3, section "bank that did not repay CPP funds, crisis", table 8) rise during the crisis.

This evidence suggests that the banks that repaid CPP funds suffered from a drop in consumer's demand during the crisis more than the banks that did not repay CPP funds. Thus, the fact of the bailout repayment did not contribute to the higher aggregate demand for the bank's products and services.

As highlighted in section 2.3, the lagged value of dependent variable was not included in the baseline regressions. The theory on Mundlak-Krishnakumar estimator does not yet provide the proof of its adequacy in the presence of autoregressive variables. The results for supplementary regressions including autoregressive component are presented in Appendices

C and D. It can be noted that the signs of the coefficients remain the same while their size and significance change for some variables (such as capital ratio, see tables C and 38).

Table 8: Mundlak-Krishnakumar Estimator - The effects of CPP funds repayment and crisis on bank lending activity. Subsample of bailed-out banks. Regressions without autoregressive variables.

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
Individual bank characteristics: banks that did not repay CPP funds, normal times (γ)						
Z_{it-1}	0.05	-0.16	0.99	0.90	-1.73	-2.51
	(0.05)	(-0.16)	(0.66)	(0.56)	(-0.48)	(-0.75)
$\frac{TE}{TA}_{it-1}$	2.62***	2.06**	2.36*	1.59	10.96***	11.82***
	(3.31)	(2.52)	(1.89)	(1.11)	(3.84)	(3.61)
$\frac{TSM}{TA}_{it-1}$	-0.32	-0.58	0.52	0.13	-2.90	-2.90
	(-0.41)	(-0.78)	(0.44)	(0.10)	(-1.17)	(-1.14)
$Size_{it-1}$	-27.65***	-25.25***	-30.65***	-25.83***	-10.97	-11.19
	(-8.46)	(-7.38)	(-6.17)	(-4.81)	(-1.43)	(-1.40)
$Sens_{it-1}$	3.87***	3.87***	4.94***	5.16***	-0.43	-0.64
	(3.51)	(3.41)	(2.93)	(2.89)	(-0.13)	(-0.20)
Individual bank characteristics: banks that did not repay CPP funds, crisis (γ^*, $\gamma+\gamma^*$ **in square brackets**)						
$Z_{it-1} * C_t$	2.27** [**2.32**]	3.03*** [**2.87**]	3.59* [**4.57**]	4.66** [**5.56**]	-2.26 [**-3.99**]	-2.44 [**-4.95**]
	(2.18)	(2.58)	(1.89)	(2.36)	(-0.83)	(-0.91)
$\frac{TE}{TA}_{it-1} * C_t$	2.22** [**4.85**]	4.02***[**6.08**]	2.29 [**4.65**]	3.82** [**5.41**]	3.45 [**14.41**]	5.68 [**17.50**]
	(1.96)	(3.72)	(1.20)	(2.03)	(0.94)	(1.53)
$\frac{TSM}{TA}_{it-1} * C_t$	0.79 [**0.92**]	1.68 [**1.72**]	-0.27 [**-0.06**]	0.55 [**0.52**]	4.95 [**1.16**]	6.04* [**2.23**]
	(0.70)	(1.45)	(-0.13)	(0.26)	(1.44)	(1.74)
$Size_{it-1} * C_t$	-2.68**[**-30.34**]	-3.89***[**-29.13**]	-5.38***[**-36.03**]	-6.43***[**-32.25**]	0.88 [**-10.09**]	-0.68 [**-11.87**]
	(-2.41)	(-3.14)	(-3.61)	(-4.15)	(0.33)	(-0.26)
$Sens_{it-1} * C_t$	-3.65***[**0.21**]	-3.44** [**0.43**]	-2.79 [**2.15**]	-2.79 [**2.36**]	-3.44 [**-3.87**]	-3.22 [**-3.87**]
	(-2.64)	(-2.04)	(-1.56)	(-1.35)	(-0.91)	(-0.85)
Individual bank characteristics: banks that repaid CPP funds, normal times (κ, $\gamma+\kappa$ **in square brackets**)						
$Z_{it-1} * R_i$	0.88 [**0.93**]	0.99 [**0.83**]	0.12 [**1.10**]	0.13 [**1.03**]	5.68 [**3.95**]	6.38* [**3.87**]
	(0.61)	(0.65)	(0.05)	(0.06)	(1.46)	(1.69)
$\frac{TE}{TA}_{it-1} * R_i$	-1.26 [**1.36**]	-1.16 [**0.90**]	-2.26 [**0.10**]	-1.96 [**-0.37**]	-8.86***[**2.09**]	-10.22***[**1.59**]
	(-1.04)	(-0.90)	(-1.17)	(-0.92)	(-2.68)	(-2.78)
$\frac{TSM}{TA}_{it-1} * R_i$	2.26** [**1.94**]	2.77*** [**2.19**]	1.74 [**2.26**]	2.39* [**2.52**]	2.65 [**-0.26**]	2.19 [**-0.71**]
	(2.43)	(2.90)	(1.21)	(1.65)	(0.93)	(0.77)
$Size_{it-1} * R_i$	5.53 [**-22.12**]	3.08 [**-22.16**]	7.68 [**-22.96**]	5.06 [**-20.77**]	-5.73 [**-16.70**]	-8.94 [**-20.13**]
	(1.42)	(0.74)	(1.33)	(0.79)	(-0.66)	(-0.97)
$Sens_{it-1} * R_i$	3.87**[**7.74**]	3.44** [**7.31**]	-0.21 [**4.73**]	-0.43 [**4.73**]	12.68***[**12.25**]	12.04***[**11.39**]
	(2.50)	(2.38)	(-0.07)	(-0.18)	(3.18)	(3.09)
Individual bank characteristics: banks that repaid CPP funds, crisis (κ^*, $\gamma+\gamma^*+\kappa+\kappa^*$ **in square brackets**)						
$Z_{it-1} * R_i * C_t$	-0.57 [**2.63**]	-1.11 [**2.75**]	0.45 [**5.14**]	-0.42 [**5.47**]	-1.14 [**0.55**]	-0.84 [**0.59**]
	(-0.39)	(-0.71)	(0.19)	(-0.17)	(-0.35)	(-0.26)
$\frac{TE}{TA}_{it-1}$	-0.60 [**2.99**]	-2.52**[**2.39**]	-1.20 [**1.20**]	-3.09 [**0.37**]	1.13 [**6.67**]	-0.60 [**6.67**]
$*R_i * C_t$	(-0.46)	(-1.96)	(-0.60)	(-1.56)	(0.32)	(-0.17)
$\frac{TSM}{TA}_{it-1}$	-1.87* [**1.48**]	-2.52**[**0.52**]	-3.35**[**-0.26**]	-3.81**[**-1.03**]	-2.39 [**-0.71**]	-3.16 [**-2.58**]
$R * C_t$	(-1.88)	(-2.21)	(-2.12)	(-2.26)	(-0.78)	(-0.98)
$Size_{it-1}$	2.04 [**-22.76**]	2.54* [**-23.51**]	2.25 [**-26.10**]	2.57 [**-24.62**]	-0.02 [**-15.84**]	0.99 [**-19.82**]
$*R_i * C_t$	(1.46)	(1.74)	(1.08)	(1.22)	(-0.01)	(0.42)
$Sens_{it-1}$	-4.51*** [**-0.43**]	-4.08** [**-0.21**]	-6.45***[**-4.51**]	-5.80**[**-3.87**]	-2.36 [**6.45**]	-1.50 [**6.66**]
$*R_i * C_t$	(-2.77)	(-2.31)	(-2.66)	(-2.38)	(-0.81)	(-0.52)
Macroeconomic conditions						
C_t	-13.18***	-7.72***	-15.78***	-8.76***	-7.98**	-6.76***
	(-8.87)	(-9.83)	(-7.12)	(-7.16)	(-2.12)	(-3.39)

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Table 8 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
R_i	3.45***	2.81***	3.02**	2.01	2.27	3.02
	(3.59)	(3.04)	(2.19)	(1.54)	(1.11)	(1.56)
$R_i * C_t$	-2.12*	0.27	-2.04	1.47	-0.40	-1.10
	(-1.77)	(0.37)	(-1.07)	(1.05)	(-0.13)	(-0.56)
ΔGDP_{t-1}		1.02***		0.35		2.41***
		(6.26)		(1.20)		(4.88)
Means						
Mean Z_{it-1}	-53.29***	-48.49***	-63.16***	-60.62**	8.85	26.44
	(-3.11)	(-2.69)	(-2.78)	(-2.54)	(0.21)	(0.61)
Mean $\frac{TE}{TA}_{it-1}$	1.32**	1.44***	1.51**	1.71**	-0.57	-0.94
	(2.42)	(2.59)	(2.00)	(2.20)	(-0.51)	(-0.76)
Mean $Size_{it-1}$	14.50***	13.41***	15.70***	13.56***	4.90	4.79
	(7.27)	(6.45)	(5.38)	(4.41)	(1.12)	(1.04)
Mean $\frac{TSM}{TA}_{it-1}$	0.47**	0.49**	0.52	0.55*	-0.17	-0.23
	(2.24)	(2.41)	(1.56)	(1.66)	(-0.37)	(-0.47)
Mean $Sens_{it-1}$	0.02	0.01	0.00	-0.03	0.12	0.16
	(0.39)	(0.18)	(0.04)	(-0.31)	(0.83)	(1.07)
Mean $Z_{it-1} * C_t$	78.66**	65.85*	59.95	46.68	57.37	44.62
	(2.42)	(1.96)	(1.31)	(1.00)	(0.89)	(0.66)
Mean $\frac{TE}{TA}_{it-1} * C_t$	-6.96***	-7.70***	-7.12***	-7.87***	-6.91**	-8.04**
	(-3.99)	(-4.32)	(-3.03)	(-3.32)	(-2.00)	(-2.19)
Mean $Size_{it-1} * C_t$	10.24**	9.70**	17.38***	15.07**	9.64	11.02
	(2.21)	(2.05)	(2.73)	(2.31)	(1.00)	(1.08)
Mean $\frac{TSM}{TA}_{it-1} * C_t$	-4.16***	-4.30***	-4.85***	-4.96***	0.58	0.10
	(-3.84)	(-3.81)	(-3.55)	(-3.46)	(0.31)	(0.05)
Mean $Sens_{it-1} * C_t$	0.79	0.82	0.88	1.01	0.80	0.37
	(0.64)	(0.65)	(0.47)	(0.52)	(0.45)	(0.18)
Mean $Z_{it-1} * R_i$	28.51	22.82	29.37	25.08	-55.16	-70.05
	(1.28)	(0.98)	(0.96)	(0.78)	(-1.18)	(-1.47)
Mean $\frac{TE}{TA}_{it-1} * R_i$	-1.81**	-1.72**	-1.34	-1.33	0.95	1.28
	(-2.36)	(-2.19)	(-1.33)	(-1.30)	(0.66)	(0.84)
Mean $Size_{it-1} * R_i$	-5.39**	-4.46	-7.32**	-6.54*	0.68	3.11
	(-2.02)	(-1.58)	(-1.99)	(-1.68)	(0.13)	(0.56)
Mean $\frac{TSM}{TA}_{it-1} * R_i$	-0.67***	-0.73***	-0.82**	-0.89**	0.32	0.38
	(-2.78)	(-3.07)	(-2.24)	(-2.40)	(0.59)	(0.69)
Mean $Sens_{it-1} * R_i$	-0.17	-0.15	-0.05	-0.00	-0.64**	-0.66**
	(-1.25)	(-1.05)	(-0.23)	(-0.01)	(-2.57)	(-2.48)
Mean $Z_{it-1} * R_i * C_t$	-32.30	-16.39	-39.69	-21.60	46.26	58.89
	(-0.84)	(-0.41)	(-0.77)	(-0.41)	(0.73)	(0.90)
Mean $\frac{TE}{TA}_{it-1} * R_i * C_t$	6.94***	7.36***	7.10***	7.59***	5.52	6.40*
	(4.25)	(4.45)	(3.23)	(3.45)	(1.64)	(1.89)
Mean $Size_{it-1} * R_i * C_t$	1.79	3.47	3.07	5.81	4.20	1.90
	(0.33)	(0.64)	(0.43)	(0.81)	(0.43)	(0.18)
Mean $\frac{TSM}{TA}_{it-1} * R_i * C_t$	1.82*	1.97*	3.40***	3.44***	-2.85*	-2.40
	(1.81)	(1.89)	(2.77)	(2.69)	(-1.70)	(-1.34)
Mean $Sens_{it-1} * R_i * C_t$	1.32	1.31	1.34	1.00	1.71	2.20
	(0.80)	(0.77)	(0.44)	(0.32)	(0.62)	(0.73)
Constant	12.88***	10.05***	14.83***	12.65***	12.15***	7.94***
	(11.41)	(10.67)	(9.08)	(9.95)	(4.17)	(3.90)
Overall R^2	0.36	0.32	0.18	0.16	0.11	0.10
Observations	2786	2711	2777	2703	2679	2611

Notes: t-statistics in parentheses; ***, ** and* denote p-value less than 0.1%, 1% and 5% respectively.

4.2 System GMM estimator

4.2.1 The effects of CPP funds disbursement and crisis on bank lending activity

One of the advantages of system GMM estimator is the possibility to include time-invariant variables and their interactions with bank-specific variables in the regressions. In this section the full specifications of models 1 and 2 are estimated which allow for systemically differential behaviour across bailed-out and non-bailed banks.

Results are presented in a similar to the previous sections way. Regressions include year dummies or macroeconomic variables as controls. Table 9 reports individual coefficients for bank-specific variables and for their interactions with dummies (such as δ, δ^*, ω and ω^*) as well as the resulting coefficients that show the full impact of an increase in the underlying variable on credit growth rates of bailed-out or non-bailed banks before and during the crisis (in square brackets).

Table 9: Two-step system robust GMM estimator - The effects of CPP funds disbursement and crisis on bank lending activity

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
Lagged values						
$\Delta ln(TL_{it-1})$	0.263***	0.285***				
	(11.76)	(13.14)				
$\Delta ln(REML_{it-1})$			0.066**	0.066**		
			(2.91)	(2.85)		
$\Delta ln(CIL_{it-1})$					0.001	-0.002
					(0.05)	(-0.09)
Individual bank characteristics: non-bailed banks, normal times (δ)						
Z_{it-1}	-1.91*	-4.26***	-3.20**	-7.92***	-5.03*	-8.69**
	(-1.95)	(-3.10)	(-2.06)	(-3.25)	(-1.68)	(-2.53)
$\frac{TE}{TA}_{it-1}$	2.27***	3.96***	2.74**	5.77***	6.53***	9.44***
	(2.87)	(4.04)	(2.40)	(4.20)	(2.61)	(3.97)
$Size_{it-1}$	1.59**	2.14**	0.30	1.51	2.20	3.93*
	(2.19)	(2.18)	(0.26)	(1.53)	(0.94)	(1.82)
$Sens_{it-1}$	2.55***	2.15***	4.36***	3.23***	1.57	-0.11
	(4.07)	(2.94)	(4.70)	(3.32)	(1.07)	(-0.07)
Individual bank characteristics: non-bailed banks, crisis (δ^*, $\delta + \delta^*$ in square brackets)						
$Z_{it-1} * C_t$	5.36***[**3.44**]	6.09***[**1.83**]	7.32***[**4.12**]	11.79***[**3.86**]	10.79***[**5.76**]	14.40***[**5.71**]
	(5.23)	(4.22)	(3.65)	(4.15)	(2.72)	(3.79)
$\frac{TE}{TA}_{it-1} * C_t$	-0.74 [**1.53**]	-1.47 [**2.48**]	-2.21 [**0.54**]	-4.30* [**1.47**]	-4.82 [**1.71**]	-7.85** [**1.58**]
	(-0.69)	(-1.18)	(-1.09)	(-1.78)	(-1.24)	(-2.26)
$Size_{it-1} * C_t$	-1.99**[**-0.40**]	-1.90* [**0.24**]	-2.22* [**-1.82**]	-2.79**[**-1.28**]	-1.10 [**1.10**]	-1.88 [**2.05**]
	(-2.21)	(-1.73)	(-1.65)	(-2.36)	(-0.38)	(-0.70)
$Sens_{it-1} * C_t$	-0.47 [**2.08**]	-0.09 [**2.06**]	-4.10*[**0.26**]	-3.27 [**-0.04**]	10.20*[**11.77**]	14.52**[**14.41**]
	(-0.31)	(-0.07)	(-1.84)	(-1.46)	(1.92)	(2.55)
Individual bank characteristics: bailed-out banks, normal times (ω, $\delta + \omega$ in square brackets)						
$Z_{it-1} * B_i$	1.61 [**-0.30**]	5.24*** [**0.98**]	2.13 [**-1.07**]	7.79*** [**-0.13**]	7.22 [**2.19**]	8.66 [**-0.02**]
	(1.14)	(2.73)	(0.90)	(2.59)	(1.60)	(1.58)

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Table 9 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
$\frac{TE}{TA}_{it-1} * B_i$	-0.48 [**1.79**]	-3.73** [**0.22**]	0.60 [**3.34**]	-4.97** [**0.80**]	-2.97 [**3.56**]	-6.41 [**3.03**]
	(-0.33)	(-2.39)	(0.25)	(-2.17)	(-0.74)	(-1.43)
$Size_{it-1} * B_i$	-2.08**[**-0.49**]	-2.32**[**-0.18**]	-0.46 [**-0.16**]	-1.57 [**-0.06**]	-2.47 [**-0.26**]	-2.94 [**0.99**]
	(-2.20)	(-2.14)	(-0.29)	(-1.36)	(-0.98)	(-1.23)
$Sens_{it-1} * B_i$	-0.19 [**2.36**]	0.45 [**2.59**]	-0.06 [**4.29**]	1.30 [**4.53**]	1.00 [**2.57**]	1.66 [**1.55**]
	(-0.20)	(0.45)	(-0.05)	(0.88)	(0.47)	(0.74)
Individual bank characteristics: bailed-out banks, crisis (ω^*, $\delta + \delta^* + \omega + \omega^*$ in square brackets)						
$Z_{it-1} * B_i * C_t$	-2.87** [**2.18**]	-4.80** [**2.27**]	-1.54[**4.71**]	-6.36* [**5.29**]	-10.02* [**2.95**]	-11.89** [**2.48**]
	(-1.98)	(-2.39)	(-0.56)	(-1.85)	(-1.94)	(-2.08)
$\frac{TE}{TA}_{it-1}$ $*B_i * C_t$	2.90 [**3.95**]	5.63*** [**4.38**]	0.61 [**1.75**]	6.43* [**2.93**]	4.76 [**3.50**]	10.87* [**6.05**]
	(1.34)	(2.83)	(0.18)	(1.95)	(0.87)	(1.87)
$Size_{it-1}$ $*B_i * C_t$	1.84* [**-0.64**]	1.06 [**-1.02**]	0.46 [**-1.82**]	0.18 [**-2.67**]	3.30 [**1.93**]	1.68 [**0.79**]
	(1.66)	(0.83)	(0.29)	(0.13)	(1.03)	(0.55)
$Sens_{it-1}$ $*B_i * C_t$	-2.38 [**-0.49**]	-2.98* [**-0.47**]	-0.62[**-0.43**]	-1.53 [**-0.28**]	-13.47**[**-0.70**]	-16.58***[**-0.51**]
	(-1.34)	(-1.91)	(-0.22)	(-0.58)	(-2.22)	(-2.60)
Macroeconomic conditions						
C_t	-6.40***	-4.63***	-10.22***	-8.87***	-9.95***	-6.70***
	(-5.67)	(-5.11)	(-5.77)	(-7.08)	(-3.26)	(-3.18)
B_i	2.48**	1.31	3.42**	2.73	4.58**	2.15
	(2.44)	(1.03)	(2.38)	(1.60)	(2.32)	(0.92)
$B_i * C_t$	-0.75	-0.78	-0.75	2.71	-2.58	-2.40
	(-0.69)	(-0.65)	(-0.47)	(1.53)	(-1.02)	(-0.80)
ΔGDP_{t-1}		0.93***		1.13***		1.83***
		(7.56)		(5.27)		(5.08)
Constant	5.91***	5.43***	9.81***	9.02***	9.35***	7.00***
	(7.91)	(6.91)	(8.49)	(8.00)	(4.84)	(4.21)
Hansen test (p-val)	0.11	0.15	0.20	0.17	0.38	0.16
Kleibergen-Paap LM test (p-val)	0.00	0.00	0.00	0.00	0.00	0.00
Kleibergen-Paap rk Wald F (stat)	30.03	30.80	29.24	28.84	41.64	42.01
AR(1) (p-val)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2) (p-val)	0.14	0.13	0.19	0.15	0.72	0.55
Obs	5512	5382	5482	5353	5185	5067

Notes: t-statistics in parentheses; ***, ** and* denote p-value less than 0.1%, 1% and 5% respectively.
Stock-Yogo weak ID test critical values: 20.27 (5% maximal IV relative bias); 10.77 (10% maximal IV relative bias); 4.17 (30% maximal IV relative bias)

The same results are presented in a more summarised way in table 10. The arrows in this table present the direction of the marginal changes in loan growth rates caused by the rise of the underlying variable by one unit. The sign of the resulting change in credit growth rates (positive or negative) is then shown in brackets.

As in the previous sections, all bank-specific variables are demeaned before entering the regressions, while the parameter estimates for the bank-specific variables are multiplied by

Table 10: Summarized results for the effects of one unit increase in bank-specific variables on loan growth rates for bailed-out/non-bailed banks in normal times/during the crisis

Var-s	**No bailout/ No crisis**	**No Bailout/ Crisis**	**Bailout/ No Crisis**	**Bailout/ Crisis**
Z_{it-1}	$-$	$\uparrow(+)$	$\uparrow(+/-)$	$\downarrow(+)$
$\frac{TE}{TA}_{it-1}$	$+$	$\downarrow(+)$	$\downarrow(+)$	$\uparrow(+)$
$\frac{TSM}{TA}_{it-1}$	$-$	$\uparrow(+)$	$\uparrow(+); CIL(-)$	$\downarrow(-); CIL(+)$
$Size_{it-1}$	$+$	$\downarrow(-); CIL(+)$	$\downarrow(-)$	$\uparrow(-); CIL(+)$
$Sens_{it-1}$	$+$	$TL \approx (+)$; $REML \downarrow (0)$; $CIL \uparrow (+)$	$\uparrow(+)$	$\downarrow(-)$

their standard deviations. Thus, the resulting coefficients show the change in the growth rate of loans when the underlying variable increases by one unit.

The test of overidentifying restrictions (Hansen's J test) provides the evidence that the instrument set, in general, is appropriate. The null hypothesis of overall valid instruments could not be rejected. The Arellano-Bond test of autocorrelation suggests that there is no autocorrelation in differences of the second order. Regressions are also tested for underidentification (Kleibergen-Paap LM test) and weak instruments (Kleibergen-Paap Wald test). The results show that regressions are identified, instruments are not weak and that they remove a substantial portion of OLS bias.

Similar to the results of the previous section, the crisis dummy has a significant negative effect on the growth rate of both types of loans as well as on that of total loans. The total loan growth rates drop by at least 5-6% (columns 2 and 3, table 9) between 2008 and 2011 for the average commercial bank when controlled for the rest of the factors. The REML growth rates decline by 9-10% (columns 4 and 5, table 9) during the crisis, which is not surprising considering the scale of the collapse in housing markets. These results correspond well to the preceding observations made from figures 1, 2 and 3.

Figures 1, 2 and 3 suggest that prior to crisis bailed-out banks were expanding their credit lines on a larger scale than non-bailed banks. Indeed, the bailout dummy has a positive coefficient, even though its effect becomes insignificant if the GDP growth is controlled for. Thus, if model 1 is estimated with system GMM, the resulting coefficients for the bailout dummy are less significant than in IV or Hausman-Taylor regressions, but they seem to be more realistic.

However, the interaction between the bailout dummy and the crisis dummy is not significant for explaining the loans growth rates contrastingly to the results of Brei *et al.* (2011)[11].

[11]Brei *et al.* (2011) find that during the crisis period loan growth rate at a rescued bank is around 8%

Thus, there is no evidence of the fact that the bank-recipient of CPP funds tend to lend less than non-bailed bank between 2008 and 2011 after controlling for bank-specific and macroeconomic conditions.

Let me now move to the bank-specific factors and analyse which of them have contributed to the loans growth and the following slowdown of the loans growth after 2007. Recall that the two "core" factors discussed in this paper are demand factor and bank's capital constraint[12].

The level of capitalisation is confirmed to have a significant positive effect on banks' credit offers both in normal times and during the crisis. In normal times a one percent rise in the capital ratio leads to a 2.3-4% rise (columns 2 and 3, section "non-bailed banks, normal times", table 9) in growth rate of total loans for the average non-bailed bank. This effect remains positive but declines during the crisis time leading to only 1.5-2.5% (columns 2 and 3, section "non-bailed banks, crisis", table 9) increase in total loans growth rate.

Hence, during the crisis more capital is required for the non-bailed banks to sustain the growth of credit supply on a pre-crisis level. This finding provides support to the idea that during the crisis additional capital is not that easily translated into extended credit offer by the banks which did not benefit from the CPP program as they prefer to keep a substantial part of it for their internal needs.

Brei *et al.* (2011) find the same trend for the impact of regulatory capital ratio (total capital over risk-weighted assets) on bank lending in normal times against the crisis period. Nevertheless, the authors report estimates that are notably smaller than the estimates obtained in this article. For their sample of 108 large international banks from 14 major advanced economies a one percentage point increase in regulatory capital ratio raises lending by around 0.9% in normal times against 0.4% during the crisis.

For the bailed-out banks the rise in equity-to-assets ratio is not as significant for expanding the credit offer during normal times as for the non-bailed banks. On the contrary, during the crisis the positive impact of greater capitalisation on credit growth is higher. A one percent rise in capital ratio of the average bailed-out bank is associated with 0.22-1.8% increase (columns 2 and 3, section "bailed-out banks, normal times", table 9) in total loans growth rate in normal times against 4-4.4% rise (columns 2 and 3, section "bailed-out banks, crisis", table 9) during the crisis.

These results in a generalised way are also reported in table 10. The table suggests that for any bank in any year an increase in capital ratio has a positive effect on the growth rate

lower than at non-rescued banks.

[12]The latter one is often referred to in the literature as the "credit crunch" or the "capital crunch", see Bernanke and Lown, 1991.

of total loans, REML and CIL (positive sign in brackets) but it has an increasing positive effect on the bailed-out banks during the crisis (upward arrow in column 5, table 10).

This means that liquidity provisions to the banks during the recent crisis supported bank lending in the aftermath of the crisis. The last result is particularly interesting because it provides the evidence that bailed-out banks display higher growth rates of loans during the crisis than in normal times (before 2008) as well as higher growth rates relative to those of non-bailed banks during the crisis, with a one percentage point increase in the capital ratio. Another conclusion that can be made from it is that during the crisis more capital is needed to sustain the same credit growth rates as before the crisis.

This result differs from that of Brei *et al.* (2011) who find that, first of all, in normal times the positive impact of capitalisation is more pronounced for rescued (bailed-out) banks. Secondly, they find that capital injections to rescued banks with very low levels of capitalisation do not produce greater lending during the crisis. More capital is only turned into greater lending when a certain capital ratio (10% in a crisis period) is restored.

Bernanke and Lown (1991) analyse the relationship between the credit crunch and bank lending during the recession of 1990. They argue that capital shortage have contributed to the slowdown in bank lending both on the state and bank level[13]. In their bank-by-bank regressions a 1% increase in the equity capital ratio results in a 2 percentage points increase in loan growth for the full sample and in a 2.5 percentage points increase for their sample of 90 small New Jersey banks. Their results in terms of sensitivity of bank loans to equity capital seem to be closer to the results of this article.

Berrospide and Edge (2010) employ several capital ratios as well as the capital surplus/shortfall measure to estimate the effect of capital shocks on loan growth rates. For the sample of 165 large bank holding companies in the U.S. they find rather small effect of capital on bank lending. According to their results a one percentage point rise in the capital ratio leads to a long-run increase[14] in annualised bank holding company loan growth between 0.7 and 1.2 percentage points.

In general the effect of capital on bank lending always remains positive, however, quantitative results differ from sample to sample which is often attributed to the sizes of the banks in that sample. Large banks are often said to be less sensitive to capital shocks than smaller banks (Bernanke and Lown, 1991).

The growth rates of REML and CIL are affected in a similar way by the rise in the

[13]The authors use the data on 50 U.S. states and District of Columbia for the first group of regressions. For the bank-by-bank regressions they use the data on 111 New Jersey banks among which 90 are considered small.

[14]Recall that a long-run impact of the bank-specific variables can be obtained from the short-run estimates by taking into account the implied value of the adjustment speed $(1 - \eta)$.

capitalisation level. The effect of an increase in capital ratio on the growth rates of these types of loans declines during the crisis. Again, it seems that the banks more exposed to commercial and industrial lending (the ones that also exhibit higher probability of receiving CPP funds, Isyuk, 2013a with an additional unit of capital tend to increase the growth rates of CIL more than the banks exposed to REML, especially during the crisis. With one percentage point increase in capital ratio, the bailed-out bank tend to raise its REML growth rates by 1.7-2.9% (columns 4 and 5, section "bailed-out banks, crisis", table 9) during the crisis, while CIL growth rates by 3.5-6% (columns 6 and 7, section "bailed-out banks, crisis", table 9).

When it is distinguished between the banks that received the CPP funds and those that did not, the impact of Z-score changes between the normal times and during the crisis. In the results for fixed effects and first difference estimators an increase by one point in Z-score (thus, increase in financial "safety" of the bank) was associated with respectively small positive or no effect during normal times and positive and significant effect during the crisis. The results for system GMM show that in normal times safer non-bailed banks expand their credit lines at a lower pace than the non-bailed banks with smaller Z-score.

However, during the crisis the situation changes and safer non-bailed banks contribute more to the rise in credit supply. Among the banks-recipients of CPP funds the impact of Z-score is not very significant in normal times while it is positive during the crisis (even though slightly smaller than for non-bailed banks). Thus, the degree of the financial "safety"[15] of the bank is particularly important for sustaining the growth rates of loans in difficult times.

The proxy for demand factor – sensitivity of the bank net revenues to the changes in GDP – is also significant for explaining banks' lending. In normal times the banks (both the recipients and non-recipients of CPP funds) with higher sensitivity to the increase in consumer's demand exhibit higher loan growth rates: a one unit increase in demand sensitivity is associated with 2.15-2.55% rise (columns 2 and 3, section "non-bailed banks, normal times", table 9) in total loans growth rate for the average non-bailed bank. Hence, the rise in demand for bank products contributed to the increase in bank lending in good times.

However, during the crisis the situation changes, especially for the different types of loans. For instance, after 2007 demand factor has no impact on the growth rates of REML for non-bailed banks. With the collapse in housing markets and generally unstable economic situation consumers were less willing to take new mortgages. In that case demand factor did not contribute to the rise in REML.

In contrast, increased demand seems to be one of the main reasons for the rise in the growth rates of CIL at the banks which did not participate in the CPP program during the

[15] Altman's Z-score defines the financial "safety" of the bank mostly based on the earnings and revenues.

crisis. A one unit rise in bank's sensitivity to the changes in GDP is associated with 11.8-14.4% higher growth rates of CIL during the crisis. This effect totally disappears in case of bailed-out banks in the same period: banks with one unit higher demand sensitivity exhibit 0.5-0.7% (columns 6 and 7, section "bailed-out banks, crisis", table 9) smaller growth rates of CIL loans than the average bailed-out bank. That may be caused by the preferences of individuals and businesses to take loans at the banks that experienced less financial troubles during the crisis (in other words, more reliable banks) what implies that the latter ones did not need to participate in the government recapitalisation schemes to continue their operations.

Besides, for bailed-out banks demand factor has a negative impact on the growth rates of REML as well as that of total loans during the crisis. A one unit increase in demand sensitivity of the average bank-recipient of CPP funds leads to a 0.5% (columns 2 and 3, section "bailed-out banks, crisis", table 9) lower total loans growth rate during the crisis. Thus, demand dropped in general for any kind of credit products offered by the bailed-out banks during the crisis.

The significance of bank size changes significantly for the bailed-out and non-bailed banks. While in the results from the previous sections larger banks were always associated with smaller growth rates of loans both in normal times and during the crisis, here the impact of size even becomes positive but only for non-bailed banks in normal times. However, that positive effect mostly disappears during the crisis. These are smaller non-bailed banks that contributed more to the growth of REML during the crisis, while larger banks continued to expand CIL. For the growth rates of total loans the size of the bank does not matter. In case of the bailed-out banks larger banks tended to lend less both in normal times and during the crisis.

4.2.2 The effects of CPP funds repayment and crisis on bank lending activity

The link between bank-specific variables and bank lending during the recent recession relative to the period before 2007 is now analysed for a smaller sample of 252 banks which received the CPP funds in 2008-2009. This group of regressions allows to study whether the factors affecting the bank lending (and particularly its slowdown between 2008 and 2011) are different for the banks that repaid the CPP funds and the banks that did not.

Regressions are run in the similar to the previous sections way. Results are reported in table 11. Bank-specific variables are now interacted with repayment dummy as well as with crisis dummy. Hansen test cannot reject the hypothesis of validity of the instruments (p-values reported at the end of table 11 are larger than 0.05). Besides, no autocorrelation is detected in levels what suggests that the instruments are not endogenous. The test for underidentification reports that all regressions are identified, while Kleibergen-Paap Wald test shows that the instrument set is not weak.

Table 11: Two-step system robust GMM estimator - The effects of CPP funds repayments and crisis on bank lending activity

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
Lagged values						
$\Delta ln(TL_{it-1})$	0.22***	0.24***				
	(7.25)	(8.97)				
$\Delta ln(REML_{it-1})$			0.01	0.03		
			(0.25)	(1.05)		
$\Delta ln(CIL_{it-1})$					-0.06*	-0.07**
					(-1.76)	(-2.05)
Individual bank characteristics: banks that did not repay CPP funds, normal times (γ)						
Z_{it-1}	-1.82	-1.50	-2.07	-1.73	-6.82	-8.00
	(-1.45)	(-1.24)	(-1.17)	(-0.93)	(-1.05)	(-1.44)
$\frac{TE}{TA}_{it-1}$	2.56**	1.83**	2.12	1.50	13.03***	13.64***
	(2.07)	(2.05)	(1.43)	(0.98)	(2.65)	(2.78)
$Size_{it-1}$	-0.80	-1.43	0.73	-0.09	4.98	5.02
	(-0.83)	(-1.49)	(0.55)	(-0.06)	(1.51)	(1.51)
$Sens_{it-1}$	1.79	1.36	3.62**	3.16**	0.62	0.31
	(1.49)	(1.12)	(2.42)	(2.06)	(0.24)	(0.12)
Individual bank characteristics: banks that did not repay CPP funds, crisis (γ^*, $\gamma + \gamma^*$ in square brackets)						
$Z_{it-1} * C_t$	5.12***[**3.30**]	5.28***[**3.78**]	7.44***[**5.38**]	8.37***[**6.65**]	7.08 [**0.26**]	8.49 [**0.49**]
	(3.02)	(3.39)	(3.58)	(3.89)	(1.01)	(1.33)
$\frac{TE}{TA}_{it-1} * C_t$	-2.03 [**0.53**]	-1.04 [**0.79**]	-2.21 [**-0.08**]	-1.43 [**0.07**]	-8.02 [**5.02**]	-7.23 [**6.41**]
	(-1.18)	(-0.61)	(-1.09)	(-0.71)	(-1.32)	(-1.12)
$Size_{it-1} * C_t$	0.25 [**-0.55**]	1.26 [**-0.18**]	-3.79**[**-3.06**]	-2.47**[**-2.56**]	0.92 [**5.90**]	1.51 [**6.53**]
	(0.208)	(1.05)	(-2.02)	(-2.13)	(0.17)	(0.27)
$Sens_{it-1} * C_t$	-2.61*[**-0.82**]	-2.32*[**-0.96**]	-2.92*[**0.70**]	-2.59* [**0.57**]	-3.61 [**-2.99**]	-3.35 [**-3.04**]
	(-1.91)	(-1.89)	(-1.85)	(-1.91)	(-0.88)	(-0.78)
Individual bank characteristics: banks that repaid CPP funds, normal times (γ, $\gamma + \kappa$ in square brackets)						
$Z_{it-1} * R_i$	1.30 [**-0.52**]	1.20 [**-0.40**]	0.97 [**-1.10**]	1.33 [**-0.40**]	5.74 [**-1.08**]	6.52 [**-1.48**]
	(0.72)	(0.62)	(0.41)	(0.57)	(0.77)	(1.08)
$\frac{TE}{TA}_{it-1} * R_i$	-2.20 [**0.36**]	-2.17 [**-0.34**]	-0.56 [**1.56**]	-1.16 [**0.34**]	-11.79**[**1.25**]	-13.04**[**0.60**]
	(-1.28)	(-1.27)	(-0.24)	(-0.50)	(-2.14)	(-2.43)
$Size_{it-1} * R_i$	0.64 [**-0.16**]	1.87 [**0.43**]	-1.49 [**-0.76**]	-0.15 [**-0.23**]	-5.29 [**-0.31**]	-4.24 [**0.78**]
	(0.54)	(1.54)	(-0.95)	(-0.09)	(-1.48)	(-1.21)
$Sens_{it-1} * R_i$	0.64 [**2.42**]	1.17 [**2.53**]	0.26 [**3.88**]	0.91 [**4.07**]	2.23 [**2.85**]	2.28 [**2.59**]
	(0.47)	(0.84)	(0.14)	(0.50)	(0.75)	(0.82)
Individual bank characteristics: banks that repaid CPP funds, crisis (κ^*, $\gamma + \gamma^* + \kappa + \kappa^*$ in square brackets)						
$Z_{it-1} * R_i * C_t$	-2.39 [**2.21**]	-2.90 [**1.99**]	-2.62 [**3.73**]	-4.58 [**3.39**]	-3.67 [**2.34**]	-5.10 [**1.91**]
	(-1.11)	(-1.45)	(-0.89)	(-1.60)	(-0.45)	(-0.74)
$\frac{TE}{TA}_{it-1}$	6.05**[**4.38**]	5.93**[**4.55**]	4.09 [**3.45**]	4.38 [**3.29**]	14.18* [**7.41**]	14.72**[**8.08**]
$*R_i * C_t$	(2.50)	(2.54)	(1.24)	(1.28)	(1.90)	(2.03)
$Size_{it-1}$	-2.96**[**-2.87**]	-4.58***[**-2.89**]	1.94 [**-2.62**]	-1.25 [**-3.96**]	-1.50 [**-0.89**]	-3.76 [**-1.47**]
$*R_i * C_t$	(-2.19)	(-3.02)	(0.86)	(-0.53)	(-0.27)	(-0.65)
$Sens_{it-1}$	0.26 [**0.07**]	-0.09 [**0.12**]	-3.78[**-2.82**]	-3.50 [**-2.03**]	6.44 [**5.69**]	7.35 [**6.60**]
$*R_i * C_t$	(0.14)	(-0.05)	(-1.30)	(-1.18)	(1.12)	(1.26)
Macroeconomic conditions						

Continued on next page

Table 11 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
C_t	-9.85***	-8.43***	-14.53***	-10.54***	-8.95*	-6.50*
	(-6.45)	(-6.99)	(-6.29)	(-5.58)	(-1.96)	(-1.89)
R_i	-0.96	-1.62	0.89	-0.70	1.41	1.37
	(-0.70)	(-1.21)	(0.48)	(-0.35)	(0.35)	(0.32)
$R_i * C_t$	3.23**	3.86**	2.06	3.82	-0.86	-1.75
	(2.18)	(2.33)	(0.86)	(1.54)	(-0.18)	(-0.33)
ΔGDP_{t-1}		0.84***		0.68***		2.51***
		(4.98)		(2.64)		(5.25)
Constant	9.27***	8.73***	12.44***	12.84***	12.60***	8.19**
	(8.22)	(8.00)	(7.02)	(8.01)	(3.58)	(2.26)
Hansen test (p-val)	0.71	0.74	0.77	0.45	0.88	0.75
Kleibergen-Paap LM test (p-val)	0.00	0.01	0.00	0.00	0.00	0.00
Kleibergen-Paap rk Wald F (stat)	23.12	22.57	26.11	27.94	30.00	31.09
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.11	0.19	0.16	0.18	0.72	0.76
Obs	2734	2665	2971	2897	2615	2552

Notes: t-statistics in parentheses; ***, ** and* denote p-value less than 0.1%, 1% and 5% respectively.
Stock-Yogo weak ID test critical values: 20.27 (5% maximal IV relative bias); 10.77 (10% maximal IV relative bias); 4.17 (30% maximal IV relative bias)

Figures 1, 2 and 3 as well as summary statistics presented in table 2 suggest that the banks that repaid the CPP funds on average exhibited higher growth rates of loans in crisis period. It is indeed confirmed by the parameter estimates from table 11. Interaction between repayment dummy and crisis dummy has a positive and significant influence on the total loans growth rate. It may be explained by the fact that the banks that reimbursed CPP funds totally by July 2012 had received enough additional capital to support their operations during the crisis and to continue providing credits to enterprises and individuals.

Among bank-specific variables it is the capitalisation level that plays an important role in explaining the growth rate of loans. For the banks that did not redeem their stock issued under the CPP an increase in capital ratio by one percentage point leads to a 1.8-2.6% (columns 2 and 3, section "banks that did not repay CPP funds, normal times", table 11) higher growth rates of total loans in normal times. The impact is particularly large for the growth rates of CIL; the same rise in capital ratio is associated with 13-13.6% (columns 6 and 7, section "banks that did not repay CPP funds, normal times", table 11) higher growth rates of CIL.

The banks that repaid CPP funds are less sensitive to higher capitalisation in normal times. The impact of capital on total lending is close to zero, while the growth rates of CIL rise by 0.6-1.2% (columns 6 and 7, section "banks that repaid CPP funds, normal times", table 11) with one percentage point increase in bank capitalisation. The situation changes during the crisis period. The banks that repaid CPP funds with one percentage point increase in capitalisation raised their total lending by 4.4-4.55% (columns 2 and 3, section "banks that repaid CPP funds, crisis", table 11). This effect is a lot smaller for the banks that did not repay the CPP funds.

These results again provide support to the idea that the banks that redeemed their stake from the Treasury had obtained enough additional capital to refinance their activities and to contribute to the higher credit offer during the crisis.

It is also in line with the results of Brei *et al.* (2011), who argue that the banks-recipients of CPP funds start to translate additional capital into greater lending during the crisis once their capitalisation exceeds a critical threshold. That critical threshold should also account for the commitment to reimburse the CPP funds. The bank that is not capable to repurchase its stake form the Treasury cannot be expected to expand the credit offer to the enterprises and individuals. It is more probable that such bank is going to adjust its assets portfolio to meet the capital requirements by cutting the number of new-issued loans.

The growth rates of REML of the banks that did not repay CPP funds are partly explained by demand factor. An increase in sensitivity to the shocks on aggregate demand by one percentage point is associated with a 3.2-3.6% rise (columns 4 and 5, section "banks that did not repay CPP funds, normal times", table 11) in REML growth rates. As expected, the effect almost disappears in the crisis period. A one unit increase in demand sensitivity leads to a 0.8-1.0% (columns 2 and 3, section "banks that did not repay CPP funds, crisis", table 11) lower growth rates of total loans during the crisis while REML still rise but only by 0.6-0.7% (columns 4 and 5, section "banks that did not repay CPP funds, crisis", table 11), with the same increase in capitalisation.

For the banks that repaid CPP funds the coefficients for demand factor are positive in normal times and close to zero or negative during the crisis. The size is not that significant for predicting bank lending when controlled for the other bank-specific variables and the fact of CPP funds repayment/non-repayment. In general larger bank that did not repay CPP funds exhibit smaller growth rates of REML during the crisis (the effect on total loans is close to zero). Larger banks that repaid CPP funds also tend to lend less during the crisis.

4.3 Summary results

The resulting coefficients from the various estimations are summarised in tables 12, 13 and 14 for the growth rates of total loans, real estate mortgage loans and commercial and industrial loans, respectively. The presented coefficients are taken from the regressions after controlling for real GDP growth for the following five samples of banks: (i) non-bailed-out banks (NB in tables); (ii) bailed-out banks (B); (iii) bailed-out banks that repurchased their stakes from the U.S. Treasury (B-R); (iv) bailed-out banks that did not repurchase their stakes from the U.S. Treasury (B-NR); and (v) the full sample of banks.

The estimated parameters are reported for three balance sheet characteristics: Altman's Z-score, the capital ratio and sensitivity to changes in consumer demand (see detailed results for each estimator in Chapter 4, Isyuk, 2013b). The share of Treasury securities to total assets is omitted because of its low significance, while the size coefficients are not reported as they are confirmed to be similar across different estimations, periods of time and samples of banks[16]. The coefficients are presented in the format "normal times/during the crisis" to allow for the results to be compared across different estimations, samples of banks and periods of time.

The coefficients obtained from the different estimations are rather similar. The parameters estimated for Altman's Z-score show that while in the period prior to 2007 the financial stability of banks did not affect the growth rates of loans (and even affected loan growth negatively in the case of non-bailed-out banks), this factor became crucial during the crisis period. Financially healthy banks extended their credit lines more than other banks during tough times.

The impact of additional capital on the growth rates of loans changes depending on the sample of banks, period of time and estimation. In general, a higher level of capitalisation is associated with higher growth rates of loans. Bailed-out banks (both those that repaid CPP funds and those that did not) significantly increased the loans offered during the crisis relative to normal times for every additional unit of capital. Moreover, for non-bailed-out banks, higher capitalisation had less impact on the growth rates of loans during the crisis relative to normal times: the sensitivity of loan growth to capital remained the same or changed insignificantly. Thus, it seems as though CPP funds were distributed in order to provide liquidity to banks for which extra capital was crucial for sustaining loan supply during the crisis.

The effectiveness of additional capital for bailed-out banks that did not repay CPP funds to the U.S. Treasury is unclear. The results from the system GMM suggest that these banks barely increased loan supply during the crisis for every additional unit of capital, whereas the results from the other estimations suggest that they significantly increased loan supply-and did so to an even larger extent than those banks that repaid CPP funds[17]. The first reason

[16]Larger banks are associated with lower growth rates of loans both in normal times and during the crisis for all subsamples of banks.

[17]Models based on GMM are expected to avoid several endogeneity biases as described in section 2.2 and

for the ambiguity of these results is the small size of that subsample that, moreover, includes those banks that had the worst financial position during the crisis and that experienced the most difficulties repurchasing their stakes from the Treasury. Secondly, these results might be related to the conclusions drawn by Brei *et al.* (2011): banks only started to translate additional capital into larger loan offers if their capitalisation level reached a certain threshold. In that sense, banks that did not repay CPP funds may not have reached this threshold. Further, as shown in graphs 1, 2 and 3, the difference in sustaining loan supply across the subsamples of banks starts around 2009, which means that the time period to capture these differences only contains three years (i.e. 2009-2011).

The growth rates of commercial and industrial loans are more sensitive to the rise of bank capital than other types of loans. This finding is also in line with those presented in Isyuk, 2013a: banks that specialised in commercial and industrial lending were more likely to be bailed out and thus they were more likely to increase commercial and industrial loan offers after receiving CPP funds from the Treasury.

Capital was less effective during the crisis than in normal times for the growth rates of mortgage loans at non-bailed-out banks. Thus, during the crisis non-bailed-out banks did not support mortgage lending as much as before the crisis, for every additional unit of capital. For bailed-out banks (both those that repaid CPP funds and those that did not), a higher capitalisation level led to higher growth rates of mortgage loans during the crisis.

Across all subsamples of banks, the higher sensitivity of a bank's income to GDP growth is positively related to the growth rates of loans in normal times. However, during the crisis more sensitive banks suffered to a larger extent from the drop in consumer demand for bank products. Thus, shrinking consumer demand also contributed to the collapse of the growth rates of total loans as well as those of mortgage and commercial and industrial loans.

5 Conclusion

Resuming the banks' loan supply to enterprises and individuals was not a primary goal of the CPP. However, restoring the U.S. financial system involved recovering banks' intermediation capacity including loans provision. Two factors that influence bank lending are analysed: a financial shock that affects banks' willingness to lend and the contraction of aggregate demand due to the overall decline in economic activity. This paper uses the methodology of Brei *et al.* (2011) in order to estimate the impact of bank capital, other balance sheet characteristics and sensitivity to demand shocks on bank lending. This framework allows us to introduce structural changes in parameter estimates for the period of the

to provide more consistent coefficients.

Table 12: Summary results - ΔTL

Var	Estimator	**NB**	**B**	**B-R**	**B-NR**	**ALL**
				Growth rates of total loans		
Z-score	Fixed Ef (full spec.)	-0.73/3.07		1.96/2.52	-0.34/4.55	-0.14/3.10
	Fixed Ef (ind)	-0.77/3.50		1.72/2.22	-0.28/3.89	
	Fixed Ef in dif-ces					0.44/2.46
	Mundlak	-0.93/2.81	0.58/3.53	0.83/2.75	-0.16/2.87	
	Hausman	-0.71/3.15	0.75/3.41	1.77/2.76	-0.10/2.66	
	IV	-1.27/3.62	0.65/4.22			
	Difference GMM					-0.01/2.45
	System GMM	-4.26/1.83	0.98/2.27	-0.40/1.99	-1.50/3.78	
Capital ratio	Fixed Ef (full spec.)	4.00/5.11		0.64/4.43	2.23/5.50	3.18/5.07
	Fixed Ef (ind)	4.57/5.75		0.45/3.09	1.94/5.02	
	Fixed Ef in dif-ces					-1.00/1.98
	Mundlak	4.17/4.98	1.80/5.24	0.90/2.39	2.06/6.08	
	Hausman	4.00/5.03	1.76/5.41	0.46/2.16	1.93/6.14	
	IV	4.90/4.77	2.62/3.01			
	Difference GMM					5.16/8.59
	System GMM	3.96/2.48	0.22/4.38	-0.34/4.55	1.83/0.79	
Sensitivity	Fixed Ef (full spec.)	4.08/1.29		7.09/2.79	4.94/-0.43	4.73/0.86
to ΔGDP	Fixed Ef (ind)	0.93/0.29		4.83/1.81	4.51/-0.41	
	Fixed Ef in dif-ces					0.12/0.24
	Mundlak	4.08/1.72	5.59/0.64	7.31/-0.21	3.87/0.43	
	Hausman	3.87/1.07	4.32/-1.05	7.52/-0.64	4.51/0.86	
	IV	4.51/1.50	6.87/-0.01			
	Difference GMM					2.15/0.21
	System GMM	2.15/2.06	2.59/-0.47	2.53/0.12	1.36/-0.96	

NB stands for non-bailed banks; B for bailed-out banks; B-R for bailed out banks that repaid CPP funds;
and B-NR for bailed-out banks that did not repay CPP funds.
Coefficients are presented in the format "A/B" where A refers to those estimated for in normal times, while B to those during the crisis period.
Fixed Ef (full spec.) are results from fixed effects model for the full sample of banks; Fixed Ef (ind) are results from estimation by bank subsamples e.g. bailed out banks in normal vs crisis per
Fixed Ef in dif-ces are results from fixed effects regressions with bank-specific characteristics in first differences.
Other results can be found in the respective sections with identical name.

Table 13: Summary results - $\Delta REML$

Var	Estimator	**NB**	**B**	**B-R**	**B-NR**	**ALL**
				Growth rates of REML		
Z-score	Fixed Ef (full spec.)	-1.32/4.62		4.33/5.65	-0.50/8.04	-0.06/5.38
	Fixed Ef (ind)	-1.37/5.55		3.79/4.99	-0.42/6.87	
	Fixed Ef in dif-ces					0.31/4.05
	Mundlak	-1.62/3.78	1.56/6.54	1.03/5.47	0.90/5.56	
	Hausman	-1.31/4.80	1.83/6.60	3.41/5.65	0.30/5.20	
	IV	-3.59/4.53	-0.48/6.06			
	Difference GMM					-1.51/5.07
	System GMM	-7.92/3.86	-0.13/5.29	-0.40/3.39	-1.73/6.65	
Capital ratio	Fixed Ef (full spec.)	4.73/4.00		-2.62/1.37	2.88/4.12	3.14/3.39
	Fixed Ef (ind)	5.26/4.18		-2.01/0.93	2.44/3.84	
	Fixed Ef in dif-ces					-1.03/1.06
	Mundlak	5.11/4.25	0.39/3.27	-0.37/0.37	1.59/5.41	
	Hausman	4.64/3.74	0.26/3.44	-1.83/-0.37	1.96/5.94	
	IV	4.86/1.47	3.10/1.26			
	Difference GMM					4.48/3.57
	System GMM	5.77/1.47	0.80/2.93	0.34/3.29	1.50/0.07	
Sensitivity	Fixed Ef (full spec.)	2.79/-0.43		4.51/-1.93	5.59/1.93	3.65/-0.21
to ΔGDP	Fixed Ef (ind)	0.64/-0.10		2.87/-1.81	5.33/1.84	
	Fixed Ef in dif-ces					-0.48/-0.12
	Mundlak	3.65/0.21	4.94/0.00	4.73/-3.87	5.16/2.36	
	Hausman	2.79/-0.43	4.11/-0.84	4.94/-6.02	5.37/3.22	
	IV	4.30/0.65	6.88/-0.64			
	Difference GMM					1.72/0.00
	System GMM	3.23/-0.04	4.53/-0.28	4.07/-2.03	3.16/0.57	

NB stands for non-bailed banks; B for bailed-out banks; B-R for bailed out banks that repaid CPP funds;
and B-NR for bailed-out banks that did not repay CPP funds.
Coefficients are presented in the format "A/B" where A refers to those estimated for in normal times, while B to those during the crisis period.
Fixed Ef (full spec.) are results from fixed effects model for the full sample of banks; Fixed Ef (ind) are results from estimation by bank subsamples e.g. bailed out banks in normal vs crisis per
Fixed Ef in dif-ces are results from fixed effects regressions with bank-specific characteristics in first differences.
Other results can be found in the respective sections with identical name.

Table 14: Summary results - ΔCIL

Var	Estimator	**NB**	**B**	**B-R**	**B-NR**	**ALL**
			Growth rates of CIL			
Z-score	Fixed Ef (full spec.)	1.80/0.77		3.68/0.14	-1.53/-5.05	1.27/-0.27
	Fixed Ef (ind)	1.92/0.38		3.25/0.10	-1.31/-4.38	
	Fixed Ef in dif-ces					0.66/-1.68
	Mundlak	1.34/0.36	1.27/-0.55	3.87/0.59	-2.51/-4.95	
	Hausman	1.44/1.98	1.49/-0.40	3.99/1.03	-2.89/-4.68	
	IV	-0.57/1.86	1.36/1.01			
	Difference GMM					-0.14/-2.04
	System GMM	-8.69/5.71	-0.02/2.48	-1.48/1.91	-8.00/0.49	
Capital ratio	Fixed Ef (full spec.)	8.55/16.84		3.18/11.21	14.14/21.87	7.91/15.08
	Fixed Ef (ind)	9.87/19.70		2.34/7.86	12.75/19.14	
	Fixed Ef in dif-ces					-0.98/6.55
	Mundlak	7.82/15.90	6.83/11.82	1.59/6.67	11.82/17.50	
	Hausman	8.46/14.82	7.61/12.33	2.06/6.27	12.08/16.33	
	IV	6.79/13.36	7.99/9.49			
	Difference GMM					10.40/24.92
	System GMM	9.44/1.58	3.03/6.05	0.60/8.08	13.64/6.41	
Sensitivity	Fixed Ef (full spec.)	6.02/4.73		10.75/7.74	-0.86/-4.30	5.37/2.79
to ΔGDP	Fixed Ef (ind)	1.38/1.03		7.69/5.43	-0.82/-4.30	
	Fixed Ef in dif-ces					1.31/0.36
	Mundlak	5.16/7.31	4.51/0.21	11.39/6.66	-0.64/-3.87	
	Hausman	4.94/4.94	6.62/2.32	10.96/6.88	-0.86/-4.08	
	IV	3.44/3.23	3.23/0.01			
	Difference GMM					3.01/1.29
	System GMM	-0.11/14.41	1.55/-0.51	2.59/6.60	0.31/-3.04	

NB stands for non-bailed banks; B for bailed-out banks; B-R for bailed out banks that repaid CPP funds;
and B-NR for bailed-out banks that did not repay CPP funds.
Coefficients are presented in the format "A/B" where A refers to those estimated for in normal times, while B to those during the crisis period.
Fixed Ef (full spec.) are results from fixed effects model for the full sample of banks; Fixed Ef (ind) are results from estimation by bank subsamples e.g. bailed out banks in normal vs crisis per
Fixed Ef in dif-ces are results from fixed effects regressions with bank-specific characteristics in first differences.
Other results can be found in the respective sections with identical name.

crisis as well as for normal times for bailed-out and non-bailed-out banks.

First, the results of the estimations suggest that bailed-out banks displayed higher growth rates for all types of loans than non-bailed-out banks both in normal times and during the crisis. Moreover, for every one percentage point increase in the capital ratio, bailed-out banks displayed higher growth rates of loans during the crisis than in normal times as well as higher growth rates than those of non-bailed-out banks during the crisis. In addition, bailed-out banks that repurchased their shares from the U.S. Treasury provided more loans during the crisis than those banks that did not. These results provide evidence that (i) in general, the CPP was efficient in terms of supporting loan growth during the crisis and (ii) banks that did not repay CPP funds experienced severe financial problems and did not translate additional capital into new loans to enterprises and individuals.

This empirical evidence on the effects of capital shortages supports the theory. Banks that have higher levels of capitalisation tended to lend more both during the crisis and in normal times. In tough times, additional capital was not easily translated into extended credit offers by banks that did not benefit from the CPP, as they preferred to keep a substantial proportion of it for their internal needs.

Moreover, the positive shock on aggregate demand had a positive effect on bank lending in good times, while that effect disappeared during the crisis. Banks (both the recipients and non-recipients of CPP funds) that have higher sensitivity to increases in consumer demand displayed higher loan growth rates. However, during the crisis the situation changed, especially in the case of mortgage lending. With the collapse of housing markets and the generally unstable economic situation, consumers were less willing to take on new mortgages, which negatively affected the growth rates of bank loans.

Appendices

A Correlation tables

Table 15: Correlation coefficients for within-transformed dependent and main explanatory variables interacted with both bailout and crisis dummy

Var	$\Delta ln\ (TL)_{it}$	$\Delta ln\ (REML)_{it}$	$\Delta ln\ (CIL)_{it}$	$Z_{it-1} * B * C$	$\frac{TE}{TA}_{it-1} * B * C$	$Size_{it-1} * B * C$	$\frac{MBS}{TA}_{it-1} * B * C$	$\frac{TSM}{TA}_{it-1} * B * C$	$Sens_{it-1} * B * C$	C_t	B_i	B_iC_t	R_i	R_iC_t	GDP_{t-1}	FF_{t-1}
$\Delta ln\ (TL)_{it}$	1.00															
$\Delta ln\ (REML)_{it}$	0.68	1.00														
$\Delta ln\ (CIL)_{it}$	0.37	-0.07	1.00													
$Z_{it-1} * B * C$	0.22	0.16	0.09	1.00												
$\frac{TE}{TA}_{it-1} * B * C$	0.08	0.04	0.06	0.43	1.00											
$Size_{it-1} * B * C$	-0.20	-0.14	-0.09	-0.35	0.04	1.00										
$\frac{MBS}{TA}_{it-1} * B * C$	-0.03	-0.03	-0.01	-0.22	-0.04	0.13	1.00									
$\frac{TSM}{TA}_{it-1} * B * C$	0.12	0.09	0.05	0.29	-0.07	-0.49	-0.23	1.00								
$Sens_{it-1} * B * C$	0.15	0.08	0.08	0.24	0.15	-0.42	-0.04	0.16	1.00							
C_t	-0.23	-0.14	-0.12	-0.09	-0.05	0.32	-0.03	-0.21	-0.27	1.00						
B_i	0.04	0.00	0.02	-0.15	-0.02	0.36	0.04	-0.22	-0.19	0.00	1.00					
B_iC_t	-0.13	-0.07	-0.09	-0.18	-0.07	0.56	-0.03	-0.37	-0.43	0.64	0.44	1.00				
R_i	0.05	0.02	0.03	-0.08	0.09	0.25	0.03	-0.17	-0.10	-0.02	**0.70**	0.27	1.00			
R_iC_t	-0.09	-0.05	-0.06	-0.14	0.05	0.45	-0.02	-0.31	-0.29	0.48	0.33	**0.76**	0.48	1.00		
GDP_{t-1}	0.31	0.20	0.16	0.25	0.03	-0.37	-0.07	0.22	0.37	-0.62	-0.01	-0.41	0.01	-0.32	1.00	
FF_{t-1}	0.22	0.13	0.11	0.24	0.03	-0.28	-0.07	0.17	0.35	-0.38	-0.01	-0.26	-0.00	-0.20	**0.84**	1.00

The correlation coefficients between dependent and explanatory variables smaller than 0.1 in their absolute values are highlighted in grey.

Table 16: Correlation coefficients for within-transformed dependent and main explanatory variables interacted with repayment dummy

Var	Δln $(TL)_{it}$	Δln $(REML)_{it}$	Δln $(CIL)_{it}$	$Z_{it-1} * R$	$\frac{TE}{TA}_{it-1} * R$	$Size_{it-1} * R$	$\frac{MBS}{TA}_{it-1} * R$	$\frac{TSM}{TA}_{it-1} * R$	$Sens_{it-1} * R$	C_t	B_i	B_iC_t	R_i	R_iC_t	GDP_{t-1}	FF_{t-1}
Δln $(TL)_{it}$	1.00															
Δln $(REML)_{it}$	0.68	1.00														
Δln $(CIL)_{it}$	0.37	-0.07	1.00													
$Z_{it-1} * R$	0.15	0.10	0.07	1.00												
$\frac{TE}{TA}_{it-1} * R$	0.04	0.01	0.03	0.44	1.00											
$Size_{it-1} * R$	-0.17	-0.10	-0.07	-0.19	0.08	1.00										
$\frac{MBS}{TA}_{it-1} * R$	-0.02	-0.02	-0.01	-0.11	-0.01	0.16	1.00									
$\frac{TSM}{TA}_{it-1} * R$	0.09	0.06	0.03	0.14	0.03	-0.43	-0.22	1.00								
$Sens_{it-1} * R$	0.16	0.07	0.10	0.27	0.03	-0.40	-0.03	0.12	1.00							
C_t	-0.23	-0.14	-0.12	-0.11	0.01	0.22	-0.05	-0.09	-0.24	1.00						
B_i	0.04	0.01	0.02	0.03	0.01	0.26	0.01	-0.20	-0.08	0.00	1.00					
B_iC_t	-0.13	-0.07	-0.09	-0.12	0.02	0.39	-0.05	-0.20	-0.34	0.64	0.44	1.00				
R_i	0.05	0.01	0.03	0.05	0.02	0.38	0.02	-0.29	-0.12	-0.02	**0.70**	0.27	1.00			
R_iC_t	-0.09	-0.05	-0.06	-0.14	0.03	0.54	-0.06	-0.28	-0.43	0.49	0.33	**0.76**	0.48	1.00		
GDP_{t-1}	0.31	0.20	0.16	0.20	-0.02	-0.23	-0.04	0.10	0.38	-0.62	-0.01	-0.41	0.01	-0.32	1.00	
FF_{t-1}	0.22	0.13	0.11	0.16	-0.04	-0.09	-0.05	0.04	0.32	-0.38	-0.01	-0.26	-0.00	-0.20	**0.84**	1.00

The correlation coefficients between dependent and explanatory variables smaller than 0.1 in their absolute values are highlighted in grey.

Table 17: Correlation coefficients for within-transformed dependent and main explanatory variables interacted with repayment and crisis dummies

Var	Δln $(TL)_{it}$	Δln $(REML)_{it}$	Δln $(CIL)_{it}$	Z_{it-1} * $R*C$	$\frac{TE}{TA}{}_{it-1}$* $R*C$	$Size_{it-1}$* $R*C$	$\frac{MBS}{TA}{}_{it-1}$* $R*C$	$\frac{TSM}{TA}{}_{it-1}$* $R*C$	$Sens_{it-1}$* $R*C$	C_t	B_i	B_iC_t	R_i	R_iC_t	GDP_{t-1}	FF_{t-1}
Δln $(TL)_{it}$	1.00															
Δln $(REML)_{it}$	0.68	1.00														
Δln $(CIL)_{it}$	0.37	-0.07	1.00													
$Z_{it-1}*R*C$	0.14	0.11	0.07	1.00												
$\frac{TE}{TA}{}_{it-1}*R*C$	0.03	0.00	0.03	0.36	1.00											
$Size_{it-1}*R*C$	-0.13	-0.09	-0.06	-0.32	0.26	1.00										
$\frac{MBS}{TA}{}_{it-1}*R*C$	0.00	-0.01	-0.00	-0.19	0.03	0.14	1.00									
$\frac{TSM}{TA}{}_{it-1}*R*C$	0.09	0.07	0.03	0.28	-0.15	-0.55	-0.21	1.00								
$Sens_{it-1}*R*C$	0.12	0.05	0.08	0.31	-0.00	-0.44	-0.01	0.21	1.00							
C_t	-0.23	-0.14	-0.12	-0.08	0.01	0.24	-0.03	-0.17	-0.23	1.00						
B_i	0.04	0.01	0.02	-0.11	0.04	0.28	0.03	-0.18	-0.16	0.00	1.00					
B_iC_t	-0.13	-0.07	-0.09	-0.15	0.03	0.43	-0.02	-0.29	-0.36	0.64	0.44	1.00				
R_i	0.05	0.01	0.03	-0.16	0.06	0.40	0.05	-0.26	-0.23	-0.02	0.70	0.27	1.00			
R_iC_t	-0.09	-0.05	-0.06	-0.21	0.04	0.58	-0.02	-0.40	-0.48	0.48	0.33	0.76	0.48	1.00		
GDP_{t-1}	0.31	0.20	0.16	0.18	-0.05	-0.28	-0.04	0.18	0.31	-0.62	-0.01	-0.41	0.01	-0.32	1.00	
FF_{t-1}	0.22	0.13	0.11	0.17	-0.05	-0.21	-0.05	0.13	0.30	-0.38	-0.01	-0.26	-0.00	-0.20	0.84	1.00

The correlation coefficients between dependent and explanatory variables smaller than 0.1 in their absolute values are highlighted in grey.

Table 18: Correlation coefficients between the instruments and the variables from first difference equation

Var	Δln TL	Δln $REML$	Δln CIL	$L.\Delta ln$ TL	$L.\Delta ln$ $REML$	$L.\Delta ln$ CIL	$L2.\Delta ln$ TL	$L2.\Delta ln$ $REML$	$L2.\Delta ln$ CIL	$L3.\Delta ln$ $(TL)_{it}$	$L3.\Delta ln$ $REML$	$L3.\Delta ln$ CIL	$L4.\Delta ln$ TL	$L4.\Delta ln$ $REML$	$L4.\Delta ln$ CIL	$D.L.\Delta ln$ TL	$D.L.\Delta$ $REML$	$D.L.\Delta$ CIL
$\Delta lnTL$	1.00																	
Δln $REML$	0.65	1.00																
Δln CIL	0.37	-0.12	1.00															
$L.\Delta ln$ TL	0.40	0.27	0.13	1.00														
$L.\Delta ln$ $REML$	0.24	0.11	0.10	0.65	1.00													
$L.\Delta ln$ CIL	0.17	0.15	-0.01	0.36	-0.13	1.00												
$L2.\Delta ln$ TL	0.23	0.16	0.05	0.36	0.24	0.11	1.00											
$L2.\Delta ln$ $REML$	0.17	0.08	0.06	0.23	0.09	0.09	0.66	1.00										
$L2.\Delta ln$ CIL	0.09	0.07	-0.02	0.15	0.14	-0.01	0.34	-0.12	1.00									
$L3.\Delta ln$ TL	0.15	0.10	0.03	0.21	0.14	0.06	0.35	0.24	0.08	1.00								
$L3.\Delta ln$ $REML$	0.08	0.04	0.04	0.16	0.09	0.08	0.23	0.10	0.09	0.67	1.00							
$L3.\Delta ln$ CIL	0.07	0.07	-0.03	0.06	0.04	-0.03	0.12	0.10	-0.05	0.31	-0.13	1.00						
$L4.\Delta ln$ TL	0.16	0.11	0.02	0.18	0.13	0.04	0.26	0.18	0.07	0.42	0.29	0.09	1.00					
$L4.\Delta ln$ $REML$	0.09	0.04	0.04	0.10	0.07	0.05	0.20	0.12	0.07	0.30	0.14	0.11	0.70	1.00				
$L4.\Delta ln$ CIL	0.06	0.05	0.02	0.09	0.07	-0.01	0.09	0.08	-0.01	0.19	0.15	-0.03	0.36	-0.04	1.00			
$D.L.\Delta ln$ TL	0.14	0.10	0.07	0.56	0.36	0.22	-0.57	-0.39	-0.17	-0.12	-0.06	-0.05	-0.07	-0.08	-0.00	1.00		
$D.L.\Delta ln$ $REML$	0.05	0.01	0.02	0.31	0.67	-0.17	-0.32	-0.68	0.19	-0.07	-0.01	-0.04	-0.04	-0.04	-0.00	0.55	1.00	
$D.L.\Delta ln$ CIL	0.05	0.06	0.01	0.14	-0.19	0.71	-0.16	0.15	-0.71	-0.01	-0.01	0.01	-0.02	-0.02	-0.00	0.27	-0.25	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

B Selection of lags of the instrumenting variables used in first-difference and level equations

Table 36: Lags for generated GMM-style instruments in difference and system GMM

Var	Name	**Diff eq TL growth**	**Level eq TL growth**	**Diff eq REML growth**	**Level eq REML growth**	**Dif eq CIL growth**	**Level eq CIL growth**
			Dependent variables				
TL growth	$\Delta ln(TL)$	lag(3 .)*	lag(2 .)*				
REML growth	$\Delta ln(REML)$			lag(3 .)*	lag(3 .)*		
CIL growth	$\Delta ln(CIL)$					lag(2 .)*	lag(2 .)*
			Individual bank characteristics: no bailout, normal times (δ)				
Altman's Z-score	Z_{it}	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(3 3)
Capital ratio	$\frac{TE}{TA}_{it}$	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(2 2)	lag(2 2)
Size	$Size_{it}$	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(2 2)	lag(2 2)
Sensitivity to ΔGDP	$Sens_{it}$	lag(2 3)	lag(2 3)	lag(2 3)	lag(2 3)	lag(2 2)	lag(2 2)
			Individual bank characteristics: no bailout, crisis (δ^*)				
Altman's Z-score	$Z_{it} * C$	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)
Capital ratio	$\frac{TE}{TA}_{it} * C$	lag(3 3)	lag(3 3)	lag(2 3)	lag(3 3)		
Size	$Size_{it} * C$	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)
Sensitivity to ΔGDP	$Sens_{it} * C$	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)
			Individual bank characteristics: bailout, no repayment, no crisis (ω)				
Altman's Z-score	$Z_{it} * B$	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)
Capital ratio	$\frac{TE}{TA}_{it} * B$	lag(2 2)	lag(3 3)	lag(3 3)	lag(3 3)	lag(2 2)	lag(2 2)
Size	$Size_{it} * B$	lag(2 2)	lag(3 3)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)
Sensitivity to ΔGDP	$Sens_{it} * B$	lag(2 3)	lag(3 3)	lag(2 3)	lag(2 3)	lag(2 2)	lag(2 2)
			Individual bank characteristics: bailout, no repayment, crisis (ω^*)				
Altman's Z-score	$Z_{it} * B * C$	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)
Capital ratio	$\frac{TE}{TA}_{it} * B * C$	lag(3 3)	lag(3 3)	lag(2 2)	lag(2 3)	lag(2 3)	lag(2 3)
Size	$Size_{it} * B * C$	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)
Sensitivity to ΔGDP	$Sens_{it} * B * C$	lag(2 3)	lag(2 3)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)
			Individual bank characteristics: bailout, repayment, no crisis (κ)				
Altman's Z-score	$Z_{it} * R$	lag(3 3)	lag(3 3)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)
Capital ratio	$\frac{TE}{TA}_{it} * B * C$	lag(3 3)	lag(3 3)	lag(3 3)	lag(2 2)	lag(2 2)	lag(2 2)
Size	$Size_{it} * R$	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)
Sensitivity to ΔGDP	$Sens_{it} * R$	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)
			Individual bank characteristics: bailout, repayment, crisis (κ^*)				
Altman's Z-score	$Z_{it} * R * C$	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)
Capital ratio	$\frac{TE}{TA}_{it} * B * C$	lag(3 3)	lag(3 3)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)

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Table 36 – *Continued from previous page*

Var	Name	**Diff eq TL growth**	**Level eq TL growth**	**Diff eq REML growth**	**Level eq REML growth**	**Dif eq CIL growth**	**Level eq CIL growth**
Size	$Size_{it} * R * C$	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)	lag(3 3)
Sensitivity to ΔGDP	$Sens_{it} * R * C$	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)	lag(2 2)
Star (*) indicates the use of "collapse" option in Stata							

C Mundlak estimator. The effects of CPP funds disbursement and crisis on bank lending activity. Regression with autoregressive component

Table 37: Mundlak-Krishnakumar Estimator - The effects of CPP funds disbursement and crisis on bank lending activity (with autoregressive component)

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
			Lagged values			
$\Delta ln(TL_{it-1})$	0.16***	0.17***				
	(9.41)	(10.99)				
$\Delta ln(REML_{it-1})$			-0.05**	-0.04*		
			(-2.48)	(-1.83)		
$\Delta ln(CIL_{it-1})$					-0.12***	-0.12***
					(-5.37)	(-5.53)
			Individual bank characteristics: non-bailed banks, normal times (δ)			
Z_{it-1}	0.63	0.68	-1.32	-1.03	1.93	1.91
	(1.03)	(1.30)	(-1.28)	(-1.17)	(1.23)	(1.16)
$\frac{TE}{TA}_{it-1}$	1.49*	1.79**	3.24***	3.48***	2.54	2.94
	(1.96)	(2.39)	(2.97)	(3.26)	(1.34)	(1.53)
$\frac{TSM}{TA}_{it-1}$	0.02	0.33	-0.22	0.04	0.01	0.44
	(0.06)	(0.79)	(-0.30)	(0.06)	(0.01)	(0.35)
$Size_{it-1}$	-17.52***	-16.22***	-18.25***	-16.80***	-18.43***	-18.01***
	(-8.88)	(-8.45)	(-6.19)	(-6.07)	(-3.66)	(-3.28)
$Sens_{it-1}$	1.70**	1.71**	2.62**	2.41*	3.20	3.16
	(2.19)	(2.24)	(1.97)	(1.88)	(1.29)	(1.23)
			Individual bank characteristics: non-bailed banks, crisis (δ^*, $\delta + \delta^*$ **in square brackets**)			
$Z_{it-1} * C_t$	3.71*** [**4.35**]	2.89*** [**3.57**]	7.71*** [**6.39**]	6.73*** [**5.70**]	1.49 [**3.42**]	0.65 [**2.56**]
	(3.89)	(3.12)	(4.89)	(4.35)	(0.44)	(0.19)
$\frac{TE}{TA}_{it-1} * C_t$	0.36 [**1.85**]	1.15 [**2.94**]	-2.43 [**0.81**]	-1.25[**2.22**]	5.17 [**7.71**]	6.40 [**9.35**]
	(0.28)	(0.92)	(-1.35)	(-0.70)	(1.28)	(1.61)
$\frac{TSM}{TA}_{it-1} * C_t$	1.18 [**1.21**]	0.65 [**0.98**]	0.77 [**0.56**]	0.06 [**0.10**]	3.14 [**3.16**]	2.30 [**2.74**]
	(1.55)	(0.84)	(0.64)	(0.05)	(1.16)	(0.86)
$Size_{it-1} * C_t$	-0.78 [**-18.30**]	-0.33 [**-16.55**]	-2.86** [**-21.12**]	-2.42* [**-19.23**]	2.12 [**-16.31**]	2.84 [**-15.16**]
	(-0.90)	(-0.37)	(-2.17)	(-1.81)	(0.72)	(0.97)
$Sens_{it-1} * C_t$	0.22 [**1.93**]	0.63 [**2.35**]	-1.74 [**0.88**]	-0.85 [**1.56**]	3.98 [**7.18**]	4.69 [**7.85**]
	(0.13)	(0.36)	(-0.75)	(-0.36)	(0.82)	(0.92)

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Table 37 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
Individual bank characteristics: bailed-out banks, normal times (ω, $\delta+\omega$ **in square brackets**)						
$Z_{it-1} * B_i$	1.16 [**1.79**]	0.91 [**3.81**]	3.11* [**10.82**]	2.67* [**9.40**]	0.82 [**2.32**]	0.48 [**1.13**]
	(1.03)	(0.85)	(1.84)	(1.67)	(0.28)	(0.16)
$\frac{TE}{TA}_{it-1} * B_i$	0.11 [**1.60**]	-0.49 [**1.30**]	-2.70 [**0.55**]	-3.38* [**0.10**]	5.15* [**7.69**]	4.46 [**7.40**]
	(0.10)	(-0.42)	(-1.47)	(-1.85)	(1.73)	(1.46)
$\frac{TSM}{TA}_{it-1} * B_i$	1.51** [**1.54**]	1.29** [**1.62**]	1.98* [**1.77**]	1.79* [**1.84**]	-1.56 [**-1.55**]	-2.00 [**-1.56**]
	(2.43)	(2.01)	(1.88)	(1.65)	(-0.85)	(-1.04)
$Size_{it-1} * B_i$	-4.22* [**-21.74**]	-6.15**[**-22.37**]	-3.92 [**-22.17**]	-5.33 [**-22.14**]	0.97 [**-17.46**]	-0.90 [**-18.91**]
	(-1.71)	(-2.45)	(-1.00)	(-1.37)	(0.16)	(-0.13)
$Sens_{it-1} * B_i$	2.43**[**4.13**]	2.17** [**3.88**]	3.40* [**6.02**]	3.20* [**5.61**]	2.69 [**5.89**]	2.28 [**5.44**]
	(2.27)	(2.04)	(1.86)	(1.79)	(0.76)	(0.64)
Individual bank characteristics: bailed-out banks, crisis (ω^*, $\delta+\delta^*+\omega+\omega^*$ **in square brackets**)						
$Z_{it-1} * B_i * C_t$	-2.83** [**2.67**]	-1.72 [**2.77**]	-3.27 [**6.23**]	-1.85 [**6.52**]	-4.38 [**-0.14**]	-3.18 [**-0.14**]
	(-2.01)	(-1.22)	(-1.42)	(-0.81)	(-1.02)	(-0.74)
$\frac{TE}{TA}_{it-1}$	3.13 [**5.09**]	3.36* [**5.81**]	4.78 [**2.90**]	4.58 [**3.42**]	-1.38 [**11.48**]	-1.21 [**12.59**]
$*B_i * C_t$	(1.60)	(1.75)	(1.61)	(1.57)	(-0.24)	(-0.21)
$\frac{TSM}{TA}_{it-1}$	-1.60 [**1.13**]	-0.74 [**1.53**]	-3.25* [**-0.71**]	-2.12 [**-0.22**]	0.43 [**2.02**]	1.70 [**2.45**]
$B * C_t$	(-1.57)	(-0.69)	(-1.90)	(-1.23)	(0.11)	(0.43)
$Size_{it-1}$	-0.12 [**-22.64**]	-1.29 [**-23.99**]	0.02 [**-25.01**]	-1.19 [**-25.75**]	-1.40 [**-16.74**]	-3.12 [**-19.19**]
$*B_i * C_t$	(-0.12)	(-1.27)	(0.01)	(-0.77)	(-0.41)	(-0.93)
$Sens_{it-1}$	-4.41** [**-0.05**]	-4.34** [**0.17**]	-4.67* [**-0.39**]	-4.69* [**0.07**]	-9.12 [**0.75**]	-9.16 [**0.97**]
$*B_i * C_t$	(-2.22)	(-2.07)	(-1.73)	(-1.67)	(-1.58)	(-1.52)
Macroeconomic conditions						
C_t	-8.48***	-6.51***	-13.27***	-9.02***	-11.80***	-7.70***
	(-8.75)	(-10.15)	(-8.28)	(-8.96)	(-3.55)	(-3.72)
B_i	0.71*	0.94**	-0.00	0.17	4.92***	4.98***
	(1.79)	(2.34)	(-0.01)	(0.26)	(3.95)	(3.84)
$B_i * C_t$	0.99	0.66	2.28*	1.88	-2.00	-2.10
	(1.25)	(0.82)	(1.84)	(1.49)	(-0.77)	(-0.80)
ΔGDP_{t-1}		0.99***		1.10***		2.06***
		(9.69)		(5.34)		(5.65)
Means						
Mean	0.79***	0.79***				
$\Delta ln(TL_{it-1})$	(20.69)	(20.44)				
Mean			0.87***	0.86***		
$\Delta ln(REML_{it-1})$			(21.13)	(20.64)		
Mean					0.75***	0.75***
$\Delta ln(CIL_{it-1})$					(13.69)	(13.10)
Mean Z_{it-1}	-15.06**	-9.68	-7.91	-3.58	-32.14*	-26.48
	(-2.48)	(-1.60)	(-0.68)	(-0.33)	(-1.72)	(-1.27)
Mean $\frac{TE}{TA}_{it-1}$	-0.18	-0.29	-0.63*	-0.72**	0.05	-0.10
	(-0.80)	(-1.26)	(-1.95)	(-2.22)	(0.09)	(-0.19)
Mean	0.03	0.00	0.07	0.05	0.08	0.04
$\frac{TSM}{TA}_{it-1}$	(0.39)	(0.04)	(0.66)	(0.45)	(0.44)	(0.20)
Mean $Size_{it-1}$	11.40***	10.60***	11.44***	10.54***	11.39***	11.04***
	(9.34)	(9.05)	(6.16)	(6.06)	(3.76)	(3.38)
Mean	-0.11**	-0.10**	-0.08	-0.07	-0.12	-0.10
$Sens_{it-1}$	(-2.29)	(-2.16)	(-1.01)	(-0.89)	(-0.85)	(-0.71)
Mean $Z_{it-1} * C_t$	5.20	3.12	-6.58	-11.41	13.65	8.75
	(0.35)	(0.21)	(-0.35)	(-0.63)	(0.40)	(0.25)
Mean	0.17	-0.25	1.03	0.46	-1.20	-1.65
$\frac{TE}{TA}_{it-1} * C_t$	(0.17)	(-0.25)	(0.85)	(0.38)	(-0.49)	(-0.68)
Mean	-0.29	-0.22	-0.39	-0.23	-0.28	-0.11
$\frac{TSM}{TA}_{it-1} * C_t$	(-1.35)	(-1.00)	(-1.16)	(-0.66)	(-0.38)	(-0.14)
Mean	-1.51	-1.48	-0.43	-0.01	2.24	2.89
$Size_{it-1} * C_t$	(-0.81)	(-0.77)	(-0.15)	(-0.00)	(0.38)	(0.48)

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Table 37 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
Mean	-0.06	-0.21	-0.83	-0.91	-2.56	-2.89
$Sens_{it-1} * C_t$	(-0.11)	(-0.41)	(-0.64)	(-0.69)	(-0.92)	(-0.99)
Mean $Z_{it-1} * B_i$	10.80	7.31	-0.64	-3.82	22.85	22.51
	(1.09)	(0.75)	(-0.04)	(-0.26)	(0.84)	(0.79)
Mean	-0.38	-0.19	0.38	0.59	-1.55*	-1.35
$\frac{TE}{TA}_{it-1} * B_i$	(-1.11)	(-0.57)	(0.75)	(1.19)	(-1.84)	(-1.55)
Mean	-0.16*	-0.16*	-0.19	-0.19	0.08	0.12
$\frac{TSM}{TA}_{it-1} * B_i$	(-1.66)	(-1.66)	(-1.22)	(-1.20)	(0.28)	(0.40)
Mean	1.43	2.59*	1.32	2.24	-0.49	0.81
$Size_{it-1} * B_i$	(0.95)	(1.71)	(0.55)	(0.93)	(-0.13)	(0.20)
Mean	-0.08	-0.08	-0.19*	-0.18*	-0.08	-0.06
$Sens_{it-1} * B_i$	(-1.44)	(-1.43)	(-1.89)	(-1.86)	(-0.44)	(-0.34)
Mean	-15.67	-14.54	-22.74	-17.96	8.93	14.82
$Z_{it-1} * B_i * C_t$	(-0.82)	(-0.76)	(-0.86)	(-0.68)	(0.18)	(0.30)
Mean	-0.54	-0.65	-0.79	-0.83	0.58	0.32
$\frac{TE}{TA}_{it-1} * B_i * C_t$	(-0.49)	(-0.58)	(-0.52)	(-0.56)	(0.19)	(0.10)
Mean	0.00	-0.07	0.21	0.02	-1.03	-1.29
$\frac{TSM}{TA}_{it-1} * B_i * C_t$	(0.01)	(-0.23)	(0.39)	(0.03)	(-0.93)	(-1.12)
Mean	3.97*	4.87*	6.25*	6.62*	-3.97	-3.73
$Size_{it-1} * B_i * C_t$	(1.67)	(1.95)	(1.68)	(1.74)	(-0.56)	(-0.51)
Mean	1.84***	1.83***	2.68*	2.45	4.82	4.92
$Sens_{it-1} * B_i * C_t$	(2.69)	(2.77)	(1.80)	(1.59)	(1.61)	(1.56)
Constant	-0.55	-1.57***	1.70	0.63	0.97	-2.07
	(-0.85)	(-2.93)	(1.47)	(0.67)	(0.48)	(-1.21)
Overall R^2	0.43	0.41	0.21	0.20	0.12	0.11
Obs	5512	5382	5482	5353	5185	5067

Notes: t-statistics in parentheses; ***, ** and* denote p-value less than 0.1%, 1% and 5% respectively.

D Mundlak estimator. The effects of CPP funds repayment and crisis on bank lending activity. Regression with autoregressive component

Table 38: Mundlak-Krishnakumar Estimator - The effects of CPP funds repayment and crisis on bank lending activity. Subsample of bailed-out banks. Regressions with autoregressive component

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
			Lagged values			
$\Delta ln(TL_{it-1})$	0.11***	0.13***				
	(5.08)	(6.53)				
$\Delta ln(REML_{it-1})$			-0.09***	-0.07***		
			(-3.15)	(-2.48)		
$\Delta ln(CIL_{it-1})$					-0.15***	-0.15***
					(-4.40)	(-4.67)

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Table 38 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
Individual bank characteristics: banks that did not repay CPP funds, normal times (γ)						
Z_{it-1}	0.90	0.51	0.96	0.58	1.26	-0.07
	(0.95)	(0.52)	(0.56)	(0.33)	(0.36)	(-0.02)
$\frac{TE}{TA}_{it-1}$	2.29**	2.17**	1.82	1.65	14.78***	15.78***
	(2.20)	(2.03)	(0.97)	(0.86)	(4.27)	(4.47)
$\frac{TSM}{TA}_{it-1}$	0.13	0.04	0.21	-0.03	-3.79	-3.81
	(0.15)	(0.04)	(0.15)	(-0.02)	(-1.55)	(-1.50)
$Size_{it-1}$	-25.46***	-24.03***	-27.05***	-23.66***	-14.68**	-14.20**
	(-11.61)	(-10.59)	(-6.84)	(-5.82)	(-2.16)	(-2.05)
$Sens_{it-1}$	3.22***	3.01***	6.28***	6.06***	1.44	1.35
	(3.63)	(3.31)	(3.91)	(3.73)	(0.54)	(0.50)
Individual bank characteristics: banks that did not repay CPP funds, crisis (γ^*, $\gamma+\gamma^*$ **in square brackets**)						
$Z_{it-1} * C_t$	1.73 [**2.63**]	2.27* [**2.78**]	5.26** [**6.22**]	6.46*** [**7.04**]	-5.27 [**-4.01**]	-4.77 [**-4.84**]
	(1.50)	(1.92)	(2.54)	(3.07)	(-1.43)	(-1.28)
$\frac{TE}{TA}_{it-1} * C_t$	2.99** [**5.28**]	5.31*** [**7.48**]	2.29 [**4.11**]	4.39* [**6.05**]	5.75 [**20.53**]	8.60** [**24.38**]
	(2.06)	(3.65)	(0.88)	(1.68)	(1.30)	(1.96)
$\frac{TSM}{TA}_{it-1} * C_t$	0.79 [**0.92**]	1.68 [**1.72**]	-0.27 [**-0.06**]	0.55 [**0.52**]	4.95 [**1.16**]	6.04* [**2.23**]
	(0.70)	(1.45)	(-0.13)	(0.26)	(1.44)	(1.74)
$Size_{it-1} * C_t$	-2.15***[**-27.61**]	-3.26***[**-27.29**]	-4.84***[**-31.88**]	-5.95***[**-29.61**]	0.78 [**-13.90**]	-0.67 [**-14.87**]
	(-2.99)	(-4.49)	(-3.72)	(-4.57)	(0.36)	(-0.31)
$Sens_{it-1} * C_t$	-2.75** [**0.47**]	-2.32* [**0.69**]	-3.50 [**2.77**]	-2.92 [**3.14**]	-4.19 [**-2.75**]	-3.93 [**-2.58**]
	(-2.06)	(-1.70)	(-1.45)	(-1.19)	(-1.05)	(-0.98)
Individual bank characteristics: banks that repaid CPP funds, normal times (κ, $\gamma+\kappa$ **in square brackets**)						
$Z_{it-1} * R_i$	1.18 [**2.09**]	1.60 [**2.11**]	1.29 [**2.25**]	1.66 [**2.24**]	1.59 [**2.85**]	2.83 [**2.76**]
	(0.92)	(1.21)	(0.55)	(0.70)	(0.37)	(0.64)
$\frac{TE}{TA}_{it-1} * R_i$	-1.03 [**1.25**]	-1.32 [**0.85**]	-1.92 [**-0.10**]	-2.44 [**-0.79**]	-10.15** [**4.63**]	-11.56** [**4.22**]
	(-0.75)	(-0.93)	(-0.77)	(-0.96)	(-2.31)	(-2.57)
$\frac{TSM}{TA}_{it-1} * R_i$	2.04** [**2.17**]	2.29** [**2.33**]	2.24 [**2.45**]	2.71 [**2.68**]	3.46 [**-0.32**]	3.25 [**-0.55**]
	(2.14)	(2.28)	(1.30)	(1.50)	(1.19)	(1.08)
$Size_{it-1} * R_i$	3.94 [**-21.51**]	2.10 [**-21.93**]	4.03 [**-23.02**]	1.05 [**-22.61**]	-0.04 [**-14.72**]	-3.63 [**-17.83**]
	(1.51)	(0.76)	(0.85)	(0.21)	(-0.00)	(-0.43)
$Sens_{it-1} * R_i$	2.79**[**6.02**]	2.64** [**5.65**]	-0.17 [**6.11**]	-0.39 [**5.68**]	11.18***[**12.62**]	10.58*** [**11.93**]
	(2.168)	(2.01)	(-0.07)	(-0.16)	(2.86)	(2.68)
Individual bank characteristics: banks that repaid CPP funds, crisis (κ^*, $\gamma+\gamma^*+\kappa+\kappa^*$ **in square brackets**)						
$Z_{it-1} * R_i * C_t$	-1.24 [**2.58**]	-1.80 [**2.58**]	-1.47 [**6.04**]	-2.57 [**6.13**]	2.89 [**0.47**]	2.69 [**0.68**]
	(-0.86)	(-1.22)	(-0.56)	(-0.97)	(0.64)	(0.59)
$\frac{TE}{TA}_{it-1}$	0.12 [**4.37**]	-2.34 [**3.82**]	-1.01 [**1.18**]	-3.46 [**0.14**]	-0.85 [**9.53**]	-3.73 [**9.09**]
$*R_i * C_t$	(0.07)	(-1.39)	(-0.33)	(-1.14)	(-0.16)	(-0.74)
$\frac{TSM}{TA}_{it-1}$	-2.16* [**0.80**]	-2.91** [**1.10**]	-3.91* [**-1.72**]	-4.42* [**-1.18**]	-2.82 [**1.80**]	-3.75 [**1.73**]
$R * C_t$	(-1.72)	(-2.26)	(-1.72)	(-1.91)	(-0.74)	(-0.97)
$Size_{it-1}$	1.83** [**-21.84**]	2.37*** [**-22.81**]	2.88** [**-24.97**]	3.28** [**-25.28**]	-0.30 [**-14.23**]	0.42 [**-18.08**]
$*R_i * C_t$	(2.31)	(2.95)	(2.02)	(2.28)	(-0.12)	(0.17)
$Sens_{it-1}$	-4.62*** [**-1.35**]	-4.34** [**-1.01**]	-9.07*** [**-6.47**]	-8.34*** [**-5.59**]	-1.66 [**6.77**]	-0.97 [**7.03**]
$*R_i * C_t$	(-2.79)	(-2.57)	(-3.00)	(-2.73)	(-0.33)	(-0.19)
Macroeconomic conditions						
C_t	-11.48***	-7.23***	-17.49***	-10.65***	-11.10***	-7.76***
	(-8.25)	(-9.86)	(-7.06)	(-8.17)	(-2.68)	(-3.60)
R_i	0.99	0.62	1.78	0.900	2.30	2.56
	(1.42)	(0.91)	(1.41)	(0.74)	(1.07)	(1.25)
$R_i * C_t$	-1.71	-0.17	-1.67	1.338	-1.075	-0.47
	(-1.61)	(-0.21)	(-0.87)	(0.96)	(-0.33)	(-0.20)
ΔGDP_{t-1}		0.78***		0.40		2.75***
		(4.73)		(1.36)		(5.61)
Means						
Mean	0.86***	0.86***				
$\Delta ln(TL_{it-1})$	(21.76)	(21.09)				

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Table 38 – *Continued from previous page*

Var	ΔTL Time-fixed	ΔTL Macro var	$\Delta REML$ Time-fixed	$\Delta REML$ Macro var	ΔCIL Time-fixed	ΔCIL Macro var
Mean			0.98***	0.97***		
$\Delta ln(REML_{it-1})$			(14.58)	(14.19)		
Mean					0.97***	0.97***
$\Delta ln(CIL_{it-1})$					(11.38)	(11.26)
Mean	5.58	11.19	1.46	6.23	14.12	33.47
Z_{it-1}	(0.56)	(1.03)	(0.09)	(0.36)	(0.32)	(0.78)
Mean	-0.61	-0.64*	-0.53	-0.49	-2.98***	-3.15***
$\frac{TE}{TA}_{it-1}$	(-1.63)	(-1.71)	(-0.82)	(-0.78)	(-2.41)	(-2.52)
Mean	14.810***	14.01***	16.12***	14.43***	9.19*	8.94*
$Size_{it-1}$	(10.74)	(9.66)	(6.73)	(5.67)	(1.91)	(1.82)
Mean	0.08	0.05	0.16	0.15	0.20	0.27
$\frac{TSM}{TA}_{it-1}$	(0.53)	(0.33)	(0.73)	(0.72)	(0.37)	(0.50)
Mean	-0.18***	-0.18***	-0.36***	-0.36***	0.06	0.10
$Sens_{it-1}$	(-3.65)	(-3.51)	(-4.04)	(-3.99)	(0.40)	(0.66)
Mean	(-3.83)	(-3.56)	(-5.34)	(-5.14)	(0.35)	(0.61)
$Z_{it-1} * C_t$	(-1.21)	(-1.68)	(-0.66)	(-0.99)	(-0.07)	(-0.20)
Mean	-0.52	-1.15	-1.15	-2.01	-2.62	-4.26
$\frac{TE}{TA}_{it-1} * C_t$	(-0.43)	(-0.91)	(-0.51)	(-0.88)	(-0.71)	(-1.15)
Mean	5.98*	6.13**	7.44	5.96	1.18	1.93
$Size_{it-1} * C_t$	(1.96)	(1.97)	(1.34)	(1.06)	(0.13)	(0.20)
Mean	-0.443	-0.48	-1.11	-1.12	-0.37	-0.94
$\frac{TSM}{TA}_{it-1} * C_t$	(-0.63)	(-0.66)	(-0.87)	(-0.85)	(-0.17)	(-0.43)
Mean	2.30**	2.07**	3.53**	3.24*	-0.22	-0.87
$Sens_{it-1} * C_t$	(2.56)	(2.24)	(2.16)	(1.95)	(-0.08)	(-0.31)
Mean	-13.71	-20.72	-10.41	-16.90	-27.35	-44.59
$Z_{it-1} * R_i$	(-0.86)	(-1.26)	(-0.36)	(-0.57)	(-0.55)	(-0.878)
Mean	0.10	0.32	0.36	0.56	1.71	1.86
$\frac{TE}{TA}_{it-1} * R_i$	(0.19)	(0.60)	(0.39)	(0.58)	(1.10)	(1.18)
Mean	-1.60	-0.61	-2.35	-1.01	0.26	2.20
$Size_{it-1} * R_i$	(-0.91)	(-0.33)	(-0.74)	(-0.30)	(0.05)	(0.39)
Mean	-0.31*	-0.30	-0.42	-0.45	-0.07	-0.13
$\frac{TSM}{TA}_{it-1} * R_i$	(-1.65)	(-1.57)	(-1.25)	(-1.30)	(-0.12)	(-0.23)
Mean	-0.06	-0.05	0.18	0.21	-0.82**	-0.88***
$Sens_{it-1} * R_i$	(-0.53)	(-0.44)	(0.90)	(1.02)	(-2.52)	(-2.63)
Mean	16.50	31.53	-3.99	14.46	28.43	36.41
$Z_{it-1} * R_i * C_t$	(0.67)	(1.25)	(-0.09)	(0.31)	(0.38)	(0.48)
Mean	0.116	0.33	1.70	2.08	2.34	3.73
$\frac{TE}{TA}_{it-1} * R_i * C_t$	(0.10)	(0.26)	(0.77)	(0.93)	(0.66)	(1.03)
Mean	-5.43*	-4.85	-4.50	-2.35	-4.44	-3.40
$Size_{it-1} * R_i * C_t$	(-1.65)	(-1.44)	(-0.75)	(-0.38)	(-0.44)	(-0.34)
Mean	0.318	0.39	1.42	1.44	-0.77	-0.21
$\frac{TSM}{TA}_{it-1} * R_i * C_t$	(0.48)	(0.57)	(1.18)	(1.16)	(-0.37)	(-0.10)
Mean	-0.10	0.08	-0.02	-0.12	4.94	5.87
$Sens_{it-1} * R_i * C_t$	(-0.07)	(0.05)	(-0.01)	(-0.04)	(1.13)	(1.33)
Constant	1.83	-0.35	3.07	2.06	2.46	-3.05
	(1.63)	(-0.41)	(1.55)	(1.42)	(0.76)	(-1.31)
Overall R^2	0.44	0.41	0.23	0.21	0.15	0.14
Observations	2734	2665	2718	2650	2615	2552

Notes: t-statistics in parentheses; ***, ** and* denote p-value less than 0.1%, 1% and 5% respectively.

Table 19: Correlation coefficients between the instruments and the variables from first difference equation. Continued (2)

Var	$L2.\Delta ln$ TL	$L2.\Delta ln$ $REML$	$L2.\Delta ln$ CIL	$L3.\Delta ln$ TL	$L3.\Delta ln$ $REML$	$L3.\Delta ln$ CIL	$L4.\Delta ln$ TL	$L4.\Delta ln$ $REML$	$L4.\Delta ln$ CIL	$D.L.Z$	$D.L.\frac{TE}{TA}$	$D.L.$ $Size$	$D.L.\frac{TSM}{TA}$	$D.L.$ $Sens$	$D.L.$ $Z*C$	$D.L.\frac{TE}{TA}*C$	$D.L.$ $Size*C$	$D.L.\frac{TSM}{TA}*C$	$D.L.$ $Sens*C$
$L2.\Delta ln$ TL	1.00																		
$L2.\Delta ln$ $REML$	0.66	1.00																	
$L2.\Delta ln$ CIL	0.32	-0.15	1.00																
$L3.\Delta ln$ TL	0.32	0.22	0.06	1.00															
$L3.\Delta ln$ $REML$	0.20	0.08	0.08	0.67	1.00														
$L3.\Delta ln$ CIL	0.11	0.11	-0.05	0.32	-0.12	1.00													
$L4.\Delta ln$ TL	0.23	0.16	0.05	0.38	0.26	0.08	1.00												
$L4.\Delta ln$ $REML$	0.17	0.09	0.07	0.26	0.12	0.11	0.69	1.00											
$L4.\Delta ln$ CIL	0.08	0.07	-0.00	0.16	0.14	-0.02	0.35	-0.07	1.00										
$D.L.Z$	0.06	0.05	0.01	-0.02	-0.01	-0.02	-0.03	-0.04	0.01	1.00									
$D.L.\frac{TE}{TA}$	0.00	-0.00	-0.02	0.00	0.00	-0.01	-0.01	-0.02	0.00	0.47	1.00								
$D.L.Size$	0.27	0.18	0.10	0.19	0.15	0.03	0.16	0.08	0.07	-0.05	-0.10	1.00							
$D.L.\frac{TSM}{TA}$	-0.00	0.00	0.01	0.02	0.02	-0.01	0.03	0.03	0.03	-0.01	0.02	0.00	1.00						
$D.L.Sens$	-0.02	-0.00	0.00	-0.11	-0.08	-0.05	-0.09	-0.08	-0.02	0.08	0.01	0.04	-0.01	1.00					
$D.L.$ $Z*C$	0.00	0.00	0.02	-0.07	-0.04	-0.02	-0.08	-0.09	0.01	0.64	0.36	0.07	0.00	0.15	1.00				
$D.L.$ $\frac{TE}{TA}*C$	0.02	-0.00	0.00	0.01	-0.00	0.01	-0.03	-0.03	0.03	0.30	0.39	-0.01	-0.01	0.02	0.56	1.00			
$D.L.$ $Size*C$	0.03	0.03	0.01	-0.00	-0.01	0.01	-0.01	0.00	0.00	-0.02	0.08	0.08	0.01	0.06	-0.00	-0.03	1.00		
$D.L.$ $\frac{TSM}{TA}*C$	-0.02	-0.01	-0.01	-0.04	-0.02	-0.02	-0.05	-0.03	-0.04	0.08	0.03	0.00	0.25	0.05	0.10	-0.01	-0.06	1.00	
$D.L.$ $Sens*C$	-0.01	0.00	0.00	-0.06	-0.04	-0.04	-0.00	-0.01	-0.01	0.03	-0.01	0.00	-0.02	0.82	0.05	-0.01	0.01	-0.01	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 20: Correlation coefficients between the instruments and the variables from first difference equation. Continued (3)

Var	$L2.\Delta ln$ TL	$L2.\Delta ln$ $REML$	$L2.\Delta ln$ CIL	$L3.\Delta ln$ $(TL)_{it}$	$L3.\Delta ln$ $REML$	$L3.\Delta ln$ CIL	$L4.\Delta ln$ TL	$L4.\Delta ln$ $REML$	$L4.\Delta ln$ CIL	$D.L.$ $Z*B$	$D.L.$ $\frac{TE}{TA}*B$	$D.L.$ $Size*B$	$D.L.$ $\frac{TSM}{TA}*B$	$D.L.$ $Sens*B$	$D.L.$ $Z*B*C$	$D.L.$ $\frac{TE}{TA}*B*C$	$D.L.$ $Size*B*C$	$D.L.$ $\frac{TSM}{TA}*B*C$	$D.L.$ $Sens*B*C$
$L2.\Delta ln$ TL	1.00																		
$L2.\Delta ln$ $REML$	0.66	1.00																	
$L2.\Delta ln$ CIL	0.32	-0.15	1.00																
$L3.\Delta ln$ TL	0.32	0.22	0.06	1.00															
$L3.\Delta ln$ $REML$	0.20	0.08	0.08	0.67	1.00														
$L3.\Delta ln$ CIL	0.11	0.11	-0.05	0.32	-0.12	1.00													
$L4.\Delta ln$ TL	0.23	0.16	0.05	0.38	0.26	0.08	1.00												
$L4.\Delta ln$ $REML$	0.17	0.09	0.07	0.26	0.12	0.11	0.69	1.00											
$L4.\Delta ln$ CIL	0.08	0.07	-0.00	0.16	0.14	-0.02	0.35	-0.07	1.00										
$D.L.Z*B$	0.07	0.05	0.01	-0.00	-0.02	0.00	-0.01	0.00	-0.01	1.00									
$D.L.$ $\frac{TE}{TA}*B$	-0.00	-0.02	-0.02	0.01	0.01	-0.01	-0.01	-0.01	0.02	0.51	1.00								
$D.L.$ $Size*B$	0.18	0.12	0.08	0.12	0.12	0.01	0.10	0.04	0.04	-0.07	-0.09	1.00							
$D.L.$ $\frac{TSM}{TA}*B$	-0.01	-0.00	-0.00	0.02	0.01	0.00	0.01	-0.00	0.03	0.01	0.04	-0.03	1.00						
$D.L.$ $Sens*B$	-0.03	-0.01	-0.00	-0.10	-0.08	-0.03	-0.04	-0.03	-0.02	-0.00	-0.03	0.02	-0.01	1.00					
$D.L.$ $Z*B*C$	0.01	0.01	0.01	-0.04	-0.03	-0.01	-0.04	-0.03	0.01	0.76	0.35	0.06	0.00	0.03	1.00				
$D.L.$ $\frac{TE}{TA}*B*C$	0.02	-0.01	0.01	0.00	0.00	-0.00	-0.02	-0.02	0.03	0.32	0.50	-0.03	0.01	-0.08	0.47	1.00			
$D.L.$ $Size*B*C$	0.01	0.01	0.01	-0.01	-0.02	0.01	-0.02	0.00	0.00	-0.03	0.14	0.07	0.03	0.06	0.01	0.05	1.00		
$D.L.$ $\frac{TSM}{TA}*B*C$	-0.00	-0.00	-0.00	-0.02	-0.01	-0.01	-0.02	-0.01	-0.03	0.05	-0.00	-0.02	0.23	-0.01	0.07	0.02	-0.10	1.00	
$D.L.$ $Sens*B*C$	-0.01	0.08	0.00	-0.05	-0.04	-0.03	0.01	0.01	-0.02	-0.03	-0.07	-0.01	-0.03	0.85	-0.03	-0.09	0.01	-0.05	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 21: Correlation coefficients between the instruments and the variables from first difference equation. Continued (4)

Var	$L2.Z$	$L2.\frac{TE}{TA}$	$L2.Size$	$L2.\frac{TSM}{TA}$	$L2.Sens$	$L2.Z*C$	$L2.\frac{TE}{TA}*C$	$L2.Size*C$	$L2.\frac{TSM}{TA}*C$	$L2.Sens*C$	$D.L.Z$	$D.L.\frac{TE}{TA}$	$D.L.Size$	$D.L.\frac{TSM}{TA}$	$D.L.Sens$	B_i	R_i	$B*C$	$R*C$
$L2.Z$	1.00																		
$L2.\frac{TE}{TA}$	0.56	1.00																	
$L2.Size$	0.05	-0.22	1.00																
$L2.\frac{TSM}{TA}$	-0.01	-0.04	-0.01	1.00															
$L2.Sens$	-0.16	0.06	-0.12	-0.06	1.00														
$L2.Z*C$	0.45	0.22	-0.01	0.04	0.05	1.00													
$L2.\frac{TE}{TA}*C$	0.26	0.38	-0.03	-0.01	0.01	0.57	1.00												
$L2.Size*C$	-0.00	-0.03	0.37	-0.02	0.01	-0.01	-0.07	1.00											
$L2.\frac{TSM}{TA}*C$	0.06	-0.02	-0.03	0.29	0.03	0.13	-0.05	-0.07	1.00										
$L2.Sens*C$	0.11	0.02	0.00	0.04	0.19	0.25	0.06	0.01	0.16	1.00									
$D.L.Z$	-0.44	-0.19	0.01	0.03	-0.01	-0.06	-0.05	0.03	0.04	0.02	1.00								
$D.L.\frac{TE}{TA}$	-0.14	-0.45	0.14	0.04	-0.13	-0.00	-0.15	0.05	0.04	0.03	0.46	1.00							
$D.L.Size$	-0.08	0.11	-0.08	-0.06	0.21	0.06	0.08	-0.04	-0.00	0.03	0.05	-0.17	1.00						
$D.L.\frac{TSM}{TA}$	0.07	-0.02	-0.01	-0.32	-0.00	0.02	0.02	-0.02	-0.04	0.01	-0.06	0.03	0.02	1.00					
$D.L.Sens$	0.01	-0.00	0.01	0.01	-0.42	-0.10	0.01	-0.04	-0.05	-0.55	0.05	0.01	0.02	-0.00	1.00				
B_i	-0.10	-0.14	0.25	-0.09	-0.02	-0.08	-0.04	0.10	-0.06	-0.02	0.01	0.07	0.04	-0.01	0.01	1.00			
R_i	-0.03	-0.09	0.33	-0.03	-0.04	-0.02	0.00	0.14	-0.02	-0.01	0.02	0.08	0.04	-0.00	0.00	0.70	1.00		
$B*C$	-0.07	-0.06	0.07	-0.05	0.03	-0.07	-0.05	0.18	-0.08	-0.03	-0.01	0.08	-0.07	-0.00	-0.00	0.45	0.28	1.00	
$R*C$	-0.02	-0.06	0.14	-0.02	0.02	-0.02	-0.02	0.11	-0.01	0.01	0.03	0.10	-0.04	-0.00	0.01	0.34	0.49	0.54	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 22: Correlation coefficients between the instruments and the variables from first difference equation. Continued (5)

Var	$L2.Z*B$	$L2.\frac{TE}{TA}*B$	$L2.Size*B$	$L2.\frac{TSM}{TA}*B$	$L2.Sens*B$	$L2.Z*B*C$	$L2.\frac{TE}{TA}*B*C$	$L2.Size*B*C$	$L2.\frac{TSM}{TA}*B*C$	$L2.Sens*B*C$	$D.L.Z$	$D.L.\frac{TE}{TA}$	$D.L.Size$	$D.L.\frac{TSM}{TA}$	$D.L.Sens$	B_i	R_i	$B*C$	$R*C$
$L2.Z*B$	1.00																		
$L2.\frac{TE}{TA}*B$	0.48	1.00																	
$L2.Size*B$	0.12	-0.19	1.00																
$L2.\frac{TSM}{TA}*B$	0.03	0.05	-0.11	1.00															
$L2.Sens*B$	-0.09	0.14	-0.14	-0.05	1.00														
$L2.Z*B*C$	0.45	0.16	0.03	0.05	0.04	1.00													
$L2.\frac{TE}{TA}*B*C$	0.21	0.36	0.03	0.01	-0.00	0.46	1.00												
$L2.Size*B*C$	0.03	0.04	0.38	-0.03	0.01	0.06	0.07	1.00											
$L2.\frac{TSM}{TA}*B*C$	0.08	0.01	-0.04	0.28	0.02	0.18	0.04	-0.12	1.00										
$L2.Sens*B*C$	0.09	-0.00	0.01	0.03	0.21	0.21	0.00	0.02	0.10	1.00									
$D.L.Z$	-0.32	-0.15	0.03	0.01	-0.01	-0.06	0.00	0.02	0.02	0.01	1.00								
$D.L.\frac{TE}{TA}$	-0.05	-0.29	0.10	0.01	-0.08	0.01	-0.06	0.02	0.01	0.03	0.46	1.00							
$D.L.Size$	0.05	0.08	-0.02	-0.03	0.11	0.06	0.08	-0.05	0.01	0.03	0.05	-0.17	1.00						
$D.L.\frac{TSM}{TA}$	0.10	-0.02	-0.01	-0.20	0.00	0.01	-0.01	-0.02	-0.01	0.01	-0.06	0.03	0.02	1.00					
$D.L.Sens$	0.00	-0.03	0.01	0.00	-0.29	-0.06	-0.01	-0.03	-0.01	-0.38	0.05	0.01	0.02	0.00	1.00				
B_i	-0.05	-0.19	0.25	-0.08	-0.08	-0.03	-0.04	0.09	-0.04	-0.02	0.01	0.07	0.04	0.00	0.01	1.00			
R_i	0.03	-0.13	0.37	0.00	-0.10	0.04	0.04	0.14	0.01	-0.00	0.02	0.07	0.04	0.00	0.00	0.70	1.00		
$B*C$	-0.06	-0.07	0.07	-0.04	0.02	-0.07	-0.08	0.19	-0.09	-0.04	-0.01	0.08	-0.00	0.00	0.00	0.45	0.29	1.00	
$R*C$	-0.00	-0.08	0.15	-0.00	0.01	-0.00	-0.01	0.12	-0.00	0.02	0.03	0.10	-0.04	0.00	0.01	0.34	0.49	0.54	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 23: Correlation coefficients between the instruments and the variables from first difference equation. Continued (6)

Var	$L2.Z*R$	$L2.\frac{TE}{TA}*R$	$L2.Size*R$	$L2.\frac{TSM}{TA}*R$	$L2.Sens*R$	$L2.Z*R*C$	$L2.\frac{TE}{TA}*R*C$	$L2.Size*R*C$	$L2.\frac{TSM}{TA}*R*C$	$L2.Sens*R*C$	$D.L.Z$	$D.L.\frac{TE}{TA}$	$D.L.Size$	$D.L.\frac{TSM}{TA}$	$D.L.Sens$	B_i	R_i	$B*C$	$R*C$
$L2.Z*R$	1.00																		
$L2.\frac{TE}{TA}*R$	0.44	1.00																	
$L2.Size*R$	0.12	-0.17	1.00																
$L2.\frac{TSM}{TA}*R$	0.02	0.08	-0.17	1.00															
$L2.Sens*R$	-0.07	0.18	-0.17	-0.06	1.00														
$L2.Z*R*C$	0.46	0.12	0.06	0.04	0.02	1.00													
$L2.\frac{TE}{TA}*R*C$	0.13	0.42	0.05	0.01	0.03	0.29	1.00												
$L2.Size*R*C$	0.06	0.06	0.45	-0.06	0.00	0.12	0.10	1.00											
$L2.\frac{TSM}{TA}*R*C$	0.05	-0.01	-0.05	0.23	0.02	0.11	-0.01	-0.12	1.00										
$L2.Sens*R*C$	0.08	-0.00	0.01	0.03	0.13	0.17	0.00	0.02	0.10	1.00									
$D.L.Z$	-0.32	-0.16	0.03	0.01	-0.02	-0.07	-0.04	0.01	0.02	0.01	1.00								
$D.L.\frac{TE}{TA}$	-0.04	-0.22	0.08	-0.01	-0.06	0.00	-0.10	0.05	0.01	0.03	0.46	1.00							
$D.L.Size$	0.06	0.04	0.00	-0.03	0.07	0.05	0.05	-0.04	0.01	0.03	0.05	-0.17	1.00						
$D.L.\frac{TSM}{TA}$	0.11	-0.00	-0.00	-0.16	0.00	0.01	-0.01	-0.01	-0.01	0.01	-0.06	0.03	0.02	1.00					
$D.L.Sens$	0.01	-0.03	0.01	0.00	-0.20	-0.00	-0.04	0.00	0.00	-0.01	-0.38	0.05	0.01	-0.00	1.00				
B_i	0.00	-0.16	0.30	-0.03	-0.03	-0.10	0.00	-0.03	0.13	-0.04	-0.02	0.01	0.07	0.04	-0.01	1.00			
R_i	0.00	-0.23	0.42	-0.04	-0.15	0.00	-0.05	0.19	0.01	-0.00	0.02	0.08	0.04	-0.00	0.00	0.70	1.00		
$B*C$	-0.00	-0.01	0.10	-0.01	0.02	0.01	-0.08	0.30	-0.09	-0.04	-0.01	0.08	-0.07	-0.00	-0.01	0.45	0.28	1.00	
$R*C$	-0.02	-0.14	0.18	-0.02	0.00	-0.00	-0.03	0.15	0.24	0.01	0.02	0.03	0.10	-0.04	0.01	0.34	0.49	0.53	1.00

D. in this table stands for first difference, L. stands for the lagged value.

Table 24: Correlation coefficients between the instruments and the variables from first difference equation. Continued (7)

Var	$L3.Z$	$L3.\frac{TE}{TA}$	$L3.Size$	$L3.\frac{TSM}{TA}$	$L3.Sens$	$L3.Z*C$	$L3.\frac{TE}{TA}*C$	$L3.Size*C$	$L3.\frac{TSM}{TA}*C$	$L3.Sens*C$	$D.L.Z$	$D.L.\frac{TE}{TA}$	$D.L.Size$	$D.L.\frac{TSM}{TA}$	$D.L.Sens$	B_i	R_i	$B*C$	$R*C$
$L3.Z$	1.00																		
$L3.\frac{TE}{TA}$	0.56	1.00																	
$L3.Size$	0.05	-0.23	1.00																
$L3.\frac{TSM}{TA}$	-0.03	-0.04	-0.02	1.00															
$L3.Sens$	-0.19	0.06	-0.13	-0.08	1.00														
$L3.Z*C$	0.31	0.16	-0.02	0.01	0.01	1.00													
$L3.\frac{TE}{TA}*C$	0.18	0.29	-0.03	-0.02	0.00	0.57	1.00												
$L3.Size*C$	-0.02	-0.02	0.27	-0.01	0.01	-0.05	-0.09	1.00											
$L3.\frac{TSM}{TA}*C$	0.02	-0.03	-0.02	0.20	0.01	0.08	-0.10	-0.06	1.00										
$L3.Sens*C$	0.08	0.04	0.02	0.03	0.04	0.25	0.13	0.10	0.15	1.00									
$D.L.Z$	-0.05	-0.12	0.04	0.04	-0.07	-0.02	-0.02	0.02	0.02	0.00	1.00								
$D.L.\frac{TE}{TA}$	-0.15	-0.37	0.12	0.03	-0.09	-0.05	-0.10	0.01	0.02	0.02	0.50	1.00							
$D.L.Size$	-0.01	0.09	-0.03	-0.05	0.12	0.05	0.06	-0.03	0.00	0.01	-0.08	-0.20	1.00						
$D.L.\frac{TSM}{TA}$	0.01	0.03	-0.02	-0.22	0.03	0.02	0.02	-0.03	-0.02	0.02	-0.00	0.00	0.02	1.00					
$D.L.Sens$	-0.01	-0.08	0.02	0.00	-0.39	-0.18	-0.09	-0.04	-0.11	-0.65	0.06	0.02	0.01	-0.01	1.00				
B_i	-0.10	-0.15	0.25	-0.09	-0.01	-0.08	-0.05	0.07	-0.05	-0.01	0.02	0.07	0.06	-0.01	0.01	1.00			
R_i	-0.03	-0.11	0.33	-0.03	-0.04	-0.03	-0.01	0.10	-0.02	0.01	0.04	0.08	0.07	-0.01	0.00	0.70	1.00		
$B*C$	-0.07	-0.08	0.07	-0.05	0.04	-0.07	-0.06	0.13	-0.05	0.02	-0.01	0.07	-0.07	-0.00	0.00	0.47	0.30	1.00	
$R*C$	-0.02	-0.07	0.15	-0.02	0.00	-0.00	-0.00	-0.01	-0.00	-0.01	0.03	0.11	-0.03	-0.01	0.00	0.36	0.51	0.54	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 25: Correlation coefficients between the instruments and the variables from first difference equation. Continued (8)

Var	$L3.Z*B$	$L3.\frac{TE}{TA}*B$	$L3.Size*B$	$L3.\frac{TSM}{TA}*B$	$L3.Sens*B$	$L3.Z*B*C$	$L3.\frac{TE}{TA}*B*C$	$L3.Size*B*C$	$L3.\frac{TSM}{TA}*B*C$	$L3.Sens*B*C$	$D.L.Z$	$D.L.\frac{TE}{TA}$	$D.L.Size$	$D.L.\frac{TSM}{TA}$	$D.L.Sens$	B_i	R_i	$B*C$	$R*C$
$L3.Z*B$	1.00																		
$L3.\frac{TE}{TA}*B$	0.47	1.00																	
$L3.Size*B$	0.12	-0.21	1.00																
$L3.\frac{TSM}{TA}*B$	0.02	0.05	-0.12	1.00															
$L3.Sens*B$	-0.12	0.15	-0.15	-0.06	1.00														
$L3.Z*B*C$	0.30	0.09	0.01	0.04	0.01	1.00													
$L3.\frac{TE}{TA}*B*C$	0.11	0.25	0.03	0.01	-0.00	0.37	1.00												
$L3.Size*B*C$	0.01	0.03	0.28	-0.02	0.01	0.02	0.06	1.00											
$L3.\frac{TSM}{TA}*B*C$	0.06	0.01	-0.03	0.20	0.00	0.20	0.04	-0.11	1.00										
$L3.Sens*B*C$	0.07	0.00	0.03	0.02	0.05	0.22	-0.00	0.13	0.08	1.00									
$D.L.Z$	-0.05	-0.08	0.02	0.00	-0.01	0.04	0.04	0.02	0.03	0.01	1.00								
$D.L.\frac{TE}{TA}$	-0.08	-0.23	0.09	-0.01	-0.04	0.03	-0.02	0.00	0.02	0.03	0.50	1.00							
$D.L.Size$	0.01	0.05	-0.00	-0.03	0.08	0.05	0.06	-0.03	0.00	0.02	-0.08	-0.20	1.00						
$D.L.\frac{TSM}{TA}$	-0.01	-0.05	0.01	-0.17	0.01	0.01	-0.01	-0.02	-0.00	0.02	-0.00	0.00	0.02	1.00					
$D.L.Sens$	-0.01	-0.06	0.01	0.00	-0.28	-0.13	-0.00	-0.04	-0.05	-0.46	0.06	0.02	0.01	0.00	1.00				
B_i	-0.05	-0.20	0.26	-0.07	-0.10	-0.03	-0.04	0.07	-0.03	-.02	0.02	0.07	0.06	-0.01	0.01	1.00			
R_i	0.03	-0.15	0.38	0.01	-0.11	0.01	0.01	0.10	0.01	0.04	0.04	0.08	0.07	-0.01	0.00	0.70	1.00		
$B*C$	-0.07	-0.12	0.07	-0.05	0.02	-0.06	-0.09	0.14	-0.06	0.04	-0.01	0.07	-0.07	-0.00	0.00	0.47	0.30	1.00	
$R*C$	-0.01	-0.10	0.16	-0.01	-0.03	0.01	0.01	-0.02	0.01	-0.01	0.03	0.11	-0.03	-0.01	0.00	0.36	0.51	0.54	1.00

D. in this table stands for first difference, L. stands for the lagged value.

Table 26: Correlation coefficients between the instruments and the variables from first difference equation. Continued (9)

Var	$L3.Z*R$	$L3.\frac{TE}{TA}*R$	$L3.Size*R$	$L3.\frac{TSM}{TA}*R$	$L3.Sens*R$	$L3.Z*R*C$	$L3.\frac{TE}{TA}*R*C$	$L3.Size*R*C$	$L3.\frac{TSM}{TA}*R*C$	$L3.Sens*R*C$	$D.L.Z$	$D.L.\frac{TE}{TA}$	$D.L.Size$	$D.L.\frac{TSM}{TA}$	$D.L.Sens$	B_i	R_i	$B*C$	$R*C$
$L3.Z*R$	1.00																		
$L3.\frac{TE}{TA}*R$	0.45	1.00																	
$L3.Size*R$	0.11	-0.20	1.00																
$L3.\frac{TSM}{TA}*R$	0.01	0.09	-0.18	1.00															
$L3.Sens*R$	-0.10	0.18	-0.19	-0.08	1.00														
$L3.Z*R*C$	0.34	0.07	0.04	0.04	-0.02	1.00													
$L3.\frac{TE}{TA}*R*C$	0.07	0.33	0.02	0.01	0.01	0.22	1.00												
$L3.Size*R*C$	0.03	0.02	0.38	-0.06	-0.00	0.09	0.02	1.00											
$L3.\frac{TSM}{TA}*R*C$	0.05	0.01	-0.08	0.27	-0.01	0.14	0.04	-0.21	1.00										
$L3.Sens*R*C$	-0.03	0.02	-0.02	-0.01	0.19	-0.08	0.08	-0.08	-0.05	1.00									
$D.L.Z$	-0.04	-0.09	0.02	0.00	-0.02	0.00	0.00	0.03	-0.01	-0.01	1.00								
$D.L.\frac{TE}{TA}$	-0.06	-0.20	0.07	-0.01	-0.05	0.01	-0.06	0.01	0.01	-0.01	0.50	1.00							
$D.L.Size$	0.02	0.01	0.01	-0.03	0.04	0.03	0.05	-0.06	0.00	-0.03	-0.08	-0.20	1.00						
$D.L.\frac{TSM}{TA}$	-0.01	-0.05	0.01	-0.16	0.01	0.01	-0.01	-0.03	-0.01	0.00	-0.01	0.00	0.02	1.00					
$D.L.Sens$	-0.02	-0.06	0.01	0.00	-0.19	-0.07	0.01	-0.02	-0.02	-0.13	0.06	0.02	0.01	0.01	1.00				
B_i	0.00	-0.18	0.30	-0.02	-0.12	-0.01	-0.07	0.12	-0.01	-0.04	0.02	0.07	0.06	-0.01	0.01	1.00			
R_i	0.00	-0.25	0.43	-0.03	-0.17	-0.01	-0.09	0.17	-0.02	-0.05	0.04	0.08	0.07	-0.01	0.00	0.70	1.00		
$B*C$	-0.01	-0.07	0.10	-0.02	0.01	-0.02	-0.14	0.25	-0.03	-0.08	-0.01	0.07	-0.07	-0.00	0.00	0.47	0.30	1.00	
$R*C$	-0.01	-0.17	0.19	-0.03	-0.04	-0.01	-0.15	0.14	-0.03	-0.13	0.03	0.11	-0.03	-0.01	0.00	0.36	0.51	0.54	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 27: Correlation coefficients between the instruments and the variables from level equation (system GMM)

Var	$L2.D.Z$	$L2.D.\frac{TE}{TA}$	$L2.D.Size$	$L2.D.\frac{TSM}{TA}$	$L2.D.Sens$	$L2.D.Z*C$	$L2.D.\frac{TE}{TA}*C$	$L2.D.Size*C$	$L2.D.\frac{TSM}{TA}*C$	$L2.D.Sens*C$	TL	$REML$	CIL	$L.TL$	$L.REML$	$L.CIL$	B_i	R_i	$B*C$	$R*C$
$L2.D.Z$	1.00	$L2.D.\frac{TE}{TA}$	0.36	1.00																
$L2.D.Size$	-0.19	-0.32	1.00																	
$L2.D.\frac{TSM}{TA}$	-0.08	0.04	0.01	1.00																
$L2.D.Sens$	0.04	0.03	0.02	0.01	1.00															
$L2.D.Z*C$	0.35	0.17	-0.00	0.01	0.15	1.00														
$L2.D.\frac{TE}{TA}*C$	0.13	0.18	-0.03	-0.02	-0.01	0.56	1.00													
$L2.D.Size*C$	-0.03	0.07	0.04	0.01	0.07	-0.02	-0.03	1.00												
$L2.D.\frac{TSM}{TA}*C$	0.05	-0.01	-0.02	0.13	0.11	0.09	-0.09	-0.05	1.00											
$L2.D.Sens*C$	0.03	-0.05	0.08	0.02	0.49	0.10	-0.08	0.05	0.09	1.00										
TL	0.01	-0.04	0.23	0.01	0.01	0.08	0.09	-0.02	-0.00	0.04	1.00									
$REML$	-0.01	-0.05	0.17	0.01	0.00	0.02	0.03	-0.02	0.01	0.02	0.66	1.00								
CIL	0.00	0.00	0.06	0.02	-0.00	0.08	0.07	-0.01	-0.01	0.02	0.35	-0.11	1.00							
$L.TL$	0.00	-0.12	0.31	-0.01	0.01	0.07	0.08	-0.07	0.00	0.05	0.41	0.29	0.13	1.00						
$L.REML$	0.01	-0.08	0.22	-0.02	-0.02	0.07	0.05	-0.04	-0.01	0.01	0.26	0.11	0.11	0.66	1.00					
$L.CIL$	-0.01	-0.05	0.10	0.01	0.05	0.01	0.03	-0.02	0.03	0.05	0.15	0.14	-0.02	0.34	-0.12	1.00				
B_i	-0.01	0.07	0.04	-0.01	-0.01	-0.06	0.00	0.07	-0.05	-0.01	0.05	0.02	0.01	0.05	0.02	0.02	1.00			
R_i	0.00	0.08	0.04	0.00	-0.00	0.00	0.04	0.10	-0.02	-0.01	0.07	0.04	0.03	0.05	0.03	0.03	0.70	1.00		
$B*C$	-0.00	0.10	-0.06	-0.00	-0.00	-0.06	-0.02	0.12	-0.06	-0.03	-0.23	-0.14	-0.12	-0.17	-0.09	-0.10	0.47	0.29	1.00	
$R*C$	0.00	0.07	-0.05	-0.00	0.03	-0.01	-0.01	0.17	-0.01	0.01	-0.08	-0.04	-0.05	-0.04	-0.02	-0.03	0.36	0.51	0.54	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 28: Correlation coefficients between the instruments and the variables from level equation (system GMM). Continued (1)

Var	$L2.D.Z*B$	$L2.D.\frac{TE}{TA}*B$	$L2.D.Size*B$	$L2.D.\frac{TSM}{TA}*B$	$L2.D.Sens*B$	$L2.D.Z*B*C$	$L2.D.\frac{TE}{TA}*B*C$	$L2.D.Size*B*C$	$L2.D.\frac{TSM}{TA}*B*C$	$L2.D.Sens*B*C$	TL	$REML$	CIL	$L.TL$	$L.REML$	$L.CIL$	B_i	R_i	$B*C$	$R*C$
$L2.D.Z*B$	1.00																			
$L2.D.\frac{TE}{TA}*B$	0.35	1.00																		
$L2.D.Size*B$	-0.16	-0.22	1.00																	
$L2.D.\frac{TSM}{TA}*B$	-0.15	0.05	-0.00	1.00																
$L2.D.Sens*B$	0.02	0.06	0.00	0.00	1.00															
$L2.D.Z*B*C$	0.44	0.26	0.03	0.02	0.08	1.00														
$L2.D.\frac{TE}{TA}*B*C$	0.18	0.30	-0.02	0.01	-0.04	0.46	1.00													
$L2.D.Size*B*C$	-0.03	0.13	0.03	0.03	0.09	0.03	0.06	1.00												
$L2.D.\frac{TSM}{TA}*B*C$	0.05	-0.01	-0.04	0.11	0.04	0.15	0.03	-0.08	1.00											
$L2.D.Sens*B*C$	-0.02	-0.03	0.06	0.00	0.50	-0.00	-0.07	0.05	0.01	1.00										
TL	0.01	-0.02	0.15	0.01	-0.01	0.09	0.06	-0.03	0.03	0.01	1.00									
$REML$	0.01	-0.04	0.12	-0.00	-0.01	0.04	0.02	-0.02	0.01	0.02	0.66	1.00								
CIL	-0.00	0.01	0.03	0.02	-0.01	0.06	0.03	-0.01	0.02	-0.01	0.35	-0.12	1.00							
$L.TL$	0.04	-0.07	0.19	-0.03	0.02	0.08	0.04	-0.08	0.02	0.03	0.41	0.29	0.13	1.00						
$L.REML$	0.04	-0.03	0.12	-0.01	-0.00	0.08	0.03	-0.05	-0.01	0.01	0.26	0.11	0.11	0.66	1.00					
$L.CIL$	0.01	-0.03	0.05	-0.01	0.03	0.01	0.03	-0.03	0.04	0.03	0.15	0.14	-0.02	0.34	-0.12	1.00				
B_i	-0.01	-0.02	0.17	-0.00	-0.01	-0.02	-0.02	0.06	-0.03	-0.02	0.05	0.02	0.01	0.05	0.02	0.02	1.00			
R_i	0.01	0.03	0.13	0.01	0.00	0.04	0.05	0.10	0.01	-0.01	0.07	0.04	0.04	0.05	0.03	0.03	0.70	1.00		
$B*C$	-0.00	0.10	-0.06	-0.00	-0.00	-0.06	-0.02	0.12	-0.06	-0.03	-0.23	-0.14	-0.12	-0.17	-0.09	-0.10	0.47	0.29	1.00	
$R*C$	0.00	0.07	-0.05	-0.00	0.03	-0.01	-0.01	0.17	-0.01	0.01	-0.08	-0.04	-0.05	-0.04	-0.02	-0.03	0.36	0.51	0.54	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 29: Correlation coefficients between the instruments and the variables from level equation (system GMM). Continued (2)

Var	$L3.D.Z$	$L3.D.\frac{TE}{TA}$	$L3.D.Size$	$L3.D.\frac{TSM}{TA}$	$L3.D.Sens$	$L3.D.Z*C$	$L3.D.\frac{TE}{TA}*C$	$L3.D.Size*C$	$L3.D.\frac{TSM}{TA}*C$	$L3.D.Sens*C$	TL	$REML$	CIL	$L.TL$	$L.REML$	$L.CIL$	B_i	R_i	$B*C$	$R*C$
$L3.D.Z$	1.00																			
$L3.D.\frac{TE}{TA}$	0.41	1.00																		
$L3.D.Size$	0.03	-0.18	1.00																	
$L3.D.\frac{TSM}{TA}$	-0.08	0.04	0.01	1.00																
$L3.D.Sens$	0.03	0.05	-0.01	0.00	1.00															
$L3.D.Z*C$	0.16	0.07	-0.02	-0.00	0.18	1.00														
$L3.D.\frac{TE}{TA}*C$	0.03	0.01	-0.00	-0.02	0.04	0.59	1.00													
$L3.D.Size*C$	-0.03	0.07	0.02	0.01	0.06	-0.04	-0.02	1.00												
$L3.D.\frac{TSM}{TA}*C$	0.04	0.00	-0.03	0.03	0.11	0.08	-0.11	-0.08	1.00											
$L3.D.Sens*C$	0.03	-0.00	0.05	-0.00	0.66	0.27	0.06	0.08	0.16	1.00										
TL	0.03	-0.02	0.17	-0.01	0.01	0.03	0.08	0.00	0.01	0.04	1.00									
$REML$	0.03	-0.01	0.13	0.00	0.01	0.06	0.08	-0.03	-0.02	0.02	0.66	1.00								
CIL	0.02	-0.03	0.04	-0.02	0.01	0.00	0.04	0.04	-0.02	0.03	0.35	-0.13	1.00							
$L.TL$	0.02	-0.04	0.24	0.02	-0.01	0.05	0.08	-0.04	-0.01	0.02	0.41	0.29	0.12	1.00						
$L.REML$	0.01	-0.05	0.18	0.01	-0.01	0.00	0.02	-0.04	0.00	0.02	0.25	0.10	0.10	0.65	1.00					
$L.CIL$	0.02	0.01	0.09	0.04	-0.01	0.08	0.08	-0.03	-0.02	-0.00	0.16	0.17	-0.04	0.35	-0.15	1.00				
B_i	-0.02	0.06	0.04	-0.00	-0.01	-0.08	-0.03	0.07	-0.06	-0.00	0.04	0.02	0.01	0.04	0.02	0.00	1.00			
R_i	-0.01	0.07	0.03	0.00	0.00	-0.04	0.00	0.10	-0.02	0.01	0.07	0.03	0.04	0.05	0.03	0.02	0.70	1.00		
$B*C$	0.00	0.07	-0.06	-0.00	-0.00	-0.06	-0.06	0.13	-0.05	0.01	-0.24	-0.15	-0.12	-0.18	-0.10	-0.11	0.49	0.30	1.00	
$R*C$	-0.00	0.02	-0.05	-0.02	0.00	-0.02	0.01	0.00	-0.02	0.01	-0.08	-0.04	-0.05	-0.04	-0.02	-0.02	0.37	0.52	0.53	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 30: Correlation coefficients between the instruments and the variables from level equation (system GMM). Continued (3)

Var	$L3.D.Z*B$	$L3.D.\frac{TE}{TA}*B$	$L3.D.Size*B$	$L3.D.\frac{TSM}{TA}*B$	$L3.D.Sens*B$	$L3.D.Z*B*C$	$L3.D.\frac{TE}{TA}*B*C$	$L3.D.Size*B*C$	$L3.D.\frac{TSM}{TA}*B*C$	$L3.D.Sens*B*C$	TL	$REML$	CIL	$L.TL$	$L.REML$	$L.CIL$	B_i	R_i	$B*C$	$R*C$
$L3.D.Z*B$	1.00																			
$L3.D.\frac{TE}{TA}*B$	0.31	1.00																		
$L3.D.Size*B$	-0.21	-0.23	1.00																	
$L3.D.\frac{TSM}{TA}*B$	-0.18	0.04	-0.00	1.00																
$L3.D.Sens*B$	0.03	0.07	-0.01	0.00	1.00															
$L3.D.Z*B*C$	0.26	0.17	0.01	0.00	0.13	1.00														
$L3.D.\frac{TE}{TA}*B*C$	0.05	0.12	-0.01	-0.00	0.05	0.38	1.00													
$L3.D.Size*B*C$	-0.04	0.14	0.02	0.03	0.08	0.02	0.09	1.00												
$L3.D.\frac{TSM}{TA}*B*C$	0.04	-0.03	-0.04	0.03	0.05	0.17	0.00	-0.10	1.00											
$L3.D.Sens*B*C$	0.03	0.02	0.07	0.03	0.67	0.20	-0.06	0.12	0.07	1.00										
TL	0.00	-0.03	0.07	-0.00	0.00	0.03	0.08	-0.02	0.02	0.01	1.00									
$REML$	0.03	-0.01	0.13	0.00	0.01	0.06	0.08	-0.03	-0.02	0.02	0.66	1.00								
CIL	0.02	-0.02	0.01	-0.02	0.01	0.03	0.04	0.04	-0.01	0.02	0.35	-0.13	1.00							
$L.TL$	-0.01	-0.03	0.14	0.01	-0.02	0.06	0.07	-0.04	0.02	0.00	0.41	0.29	0.12	1.00						
$L.REML$	-0.01	-0.05	0.11	-0.00	-0.01	0.02	0.02	-0.03	0.01	0.02	0.25	0.10	0.00	0.65	1.00					
$L.CIL$	-0.02	-0.00	0.02	0.04	-0.02	0.06	0.04	-0.02	0.03	-0.02	0.16	0.17	-0.03	0.35	-0.15	1.00				
B_i	-0.01	-0.04	0.19	-0.00	-0.01	-0.02	-0.05	0.07	-0.02	0.01	0.04	0.02	0.01	0.04	0.02	0.00	1.00			
R_i	-0.00	0.01	0.14	0.01	0.01	0.01	0.02	0.10	0.01	0.02	0.07	0.03	0.02	0.05	0.03	0.02	0.70	1.00		
$B*C$	0.01	0.06	-0.02	-0.00	0.03	-0.04	-0.10	0.14	-0.05	0.02	-0.24	-0.15	-0.12	-0.18	-0.10	-0.11	0.49	0.30	1.00	
$R*C$	0.01	-0.01	-0.02	-0.02	0.00	0.01	0.02	-0.03	0.01	0.02	0.25	0.10	0.00	0.02	-0.02	-0.02	0.37	0.52	0.53	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 31: Correlation coefficients between the instruments and the variables from level equation (system GMM). Continued (4)

Var	$L2.D.Z*R$	$L2.D.\frac{TE}{TA}*R$	$L2.D.Size*R$	$L2.D.\frac{TSM}{TA}*R$	$L2.D.Sens*R$	$L2.D.Z*R*C$	$L2.D.\frac{TE}{TA}*R*C$	$L2.D.Size*R*C$	$L2.D.\frac{TSM}{TA}*R*C$	$L2.D.Sens*R*C$	TL	$REML$	CIL	$L.TL$	$L.REML$	$L.CIL$	B_i	R_i	$B*C$	$R*C$
$L2.D.Z*R$	1.00																			
$L2.D.\frac{TE}{TA}*R$	0.34	1.00																		
$L2.D.Size*R$	-0.21	-0.16	1.00																	
$L2.D.\frac{TSM}{TA}*R$	-0.24	0.04	0.02	1.00																
$L2.D.Sens*R$	0.02	0.07	-0.01	0.00	1.00															
$L2.D.Z*R*C$	0.45	0.27	0.02	0.02	0.06	1.00														
$L2.D.\frac{TE}{TA}*R*C$	0.18	0.41	-0.02	0.02	0.00	0.43	1.00													
$L2.D.Size*R*C$	-0.03	-0.03	0.07	0.02	0.03	0.11	-0.10	1.00												
$L2.D.\frac{TSM}{TA}*R*C$	0.00	0.04	-0.02	0.14	0.02	0.01	0.08	-0.19	1.00											
$L2.D.Sens*R*C$	-0.01	-0.02	0.05	0.00	0.34	0.02	-0.02	0.01	0.01	1.00										
TL	0.02	-0.01	0.14	0.03	-0.01	0.03	0.01	-0.07	0.01	0.01	1.00									
$REML$	-0.04	-0.01	0.11	0.02	-0.01	0.02	-0.01	-0.04	-0.01	0.02	0.66	1.00								
CIL	0.01	-0.01	0.04	0.01	0.01	0.04	0.02	-0.05	0.01	0.02	0.35	-0.11	1.00							
$L.TL$	0.01	-0.03	0.15	0.01	0.01	-0.00	0.04	-0.01	0.04	-0.03	0.41	0.29	0.13	1.00						
$L.REML$	0.02	-0.02	0.09	0.02	-0.03	0.05	-0.01	0.03	-0.02	0.00	0.25	0.11	0.11	0.66	1.00					
$L.CIL$	-0.00	-0.02	0.05	-0.01	0.03	-0.00	-0.01	0.02	-0.02	0.03	0.15	0.14	-0.02	0.34	-0.12	1.00				
B_i	0.01	0.01	0.15	0.01	-0.01	0.02	0.02	0.08	-0.01	-0.02	0.05	0.02	0.01	0.05	0.02	0.02	1.00			
R_i	0.00	0.02	0.21	0.01	0.01	0.02	0.02	0.11	-0.01	-0.01	0.07	0.03	0.03	0.05	0.03	0.03	0.70	1.00		
$B*C$	0.03	0.13	-0.06	-0.00	0.02	0.03	0.03	0.04	0.17	-0.02	-0.04	-0.23	-0.14	-0.17	-0.09	-0.10	0.47	0.29	1.00	
$R*C$	0.01	0.07	-0.00	-0.00	0.06	-0.01	-0.04	0.22	-0.02	0.02	-0.08	-0.04	-0.05	-0.04	-0.02	-0.03	0.36	0.51	0.54	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 32: Correlation coefficients between the instruments and the variables from level equation (system GMM). Continued (5)

Var	$L2.D.Z$	$L2.D.\frac{TE}{TA}$	$L2.D.Size$	$L2.D.\frac{TSM}{TA}$	$L2.D.Sens$	$L2.D.Z*C$	$L2.D.\frac{TE}{TA}*C$	$L2.D.Size*C$	$L2.D.\frac{TSM}{TA}*C$	$L2.D.Sens*C$	$L.Z$	$L.\frac{TE}{TA}$	$L.Size$	$L.\frac{TSM}{TA}$	$L.Sens$	$L.Z*C$	$L.\frac{TE}{TA}*C$	$L.Size*C$
$L2.D.Z$	1.00																	
$L2.D.\frac{TE}{TA}$	0.43	1.00																
$L2.D.Size$	-0.03	-0.18	1.00															
$L2.D.\frac{TSM}{TA}$	-0.07	0.04	0.01	1.00														
$L2.D.Sens$	0.04	0.03	0.02	0.00	1.00													
$L2.D.Z*C$	0.31	0.17	0.00	0.01	0.19	1.00												
$L2.D.\frac{TE}{TA}*C$	0.12	0.15	-0.03	-0.02	0.03	0.58	1.00											
$L2.D.Size*C$	-0.02	0.06	0.04	0.01	0.09	-0.03	-0.08	1.00										
$L2.D.\frac{TSM}{TA}*C$	0.05	0.01	-0.02	0.11	0.10	0.09	-0.08	-0.04	1.00									
$L2.D.Sens*C$	0.04	-0.04	0.07	0.02	0.50	0.12	-0.05	0.05	0.08	1.00								
$L.Z$	0.13	0.15	-0.10	0.01	0.20	0.35	0.20	0.02	0.08	0.14	1.00							
$L.\frac{TE}{TA}$	0.06	0.10	-0.01	-0.00	0.07	0.20	0.26	0.01	-0.01	0.05	0.63	1.00						
$L.Size$	0.00	0.12	0.03	-0.01	0.03	0.00	0.00	0.27	-0.02	0.01	0.07	-0.12	1.00					
$L.\frac{TSM}{TA}$	-0.01	0.05	-0.05	0.09	0.04	0.04	-0.00	-0.02	0.22	0.05	0.02	-0.01	-0.04	1.00				
$L.Sens$	0.04	-0.07	0.24	-0.02	0.06	0.04	0.03	0.01	0.04	-0.17	-0.14	-0.04	-0.09	-0.07	1.00			
$L.Z*C$	0.18	0.12	0.00	0.00	0.24	0.49	0.28	0.03	0.11	0.20	0.71	0.36	0.01	0.07	0.01	1.00		
$L.\frac{TE}{TA}*C$	0.09	0.06	0.00	-0.01	0.10	0.36	0.48	0.00	-0.01	0.10	0.45	0.55	0.01	0.00	0.00	0.64	1.00	
$L.Size*C$	-0.02	0.06	0.00	-0.01	0.06	0.01	0.00	0.57	-0.04	0.01	0.02	0.01	0.48	-0.04	-0.00	0.03	0.00	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 33: Correlation coefficients between the instruments and the variables from level equation (system GMM). Continued (6)

Var	$L2.D.Z*B$	$L2.D.\frac{TE}{TA}*B$	$L2.D.Size*B$	$L2.D.\frac{TSM}{TA}*B$	$L2.D.Sens*B$	$L2.D.Z*B*C$	$L2.D.\frac{TE}{TA}*B*C$	$L2.D.Size*B*C$	$L2.D.\frac{TSM}{TA}*B*C$	$L2.D.Sens*B*C$	$L.Z$	$L.\frac{TE}{TA}$	$L.Size$	$L.\frac{TSM}{TA}$	$L.Sens$	$L.Z*C$	$L.\frac{TE}{TA}*C$	$L.Size*C$
$L2.D.Z*B$	1.00																	
$L2.D.\frac{TE}{TA}*B$	0.35	1.00																
$L2.D.Size*B$	-0.17	-0.21	1.00															
$L2.D.\frac{TSM}{TA}*B$	-0.16	0.06	0.00	1.00														
$L2.D.Sens*B$	0.02	0.07	0.01	0.00	1.00													
$L2.D.Z*B*C$	0.44	0.26	0.03	0.02	0.09	1.00												
$L2.D.\frac{TE}{TA}*B*C$	0.18	0.30	-0.02	0.01	-0.02	0.47	1.00											
$L2.D.Size*B*C$	-0.03	0.13	0.03	0.02	0.08	0.02	0.05	1.00										
$L2.D.\frac{TSM}{TA}*B*C$	0.05	0.00	-0.04	0.11	0.03	0.15	0.03	-0.10	1.00									
$L2.D.Sens*B*C$	-0.00	-0.02	0.06	0.00	0.52	0.02	-0.05	0.04	0.00	1.00								
$L.Z$	0.06	0.11	-0.03	0.03	0.09	0.19	0.11	0.02	0.04	0.08	1.00							
$L.\frac{TE}{TA}$	-0.02	0.07	-0.03	0.02	0.01	0.08	0.14	0.03	-0.00	0.01	0.63	1.00						
$L.Size$	0.02	0.09	0.07	0.01	0.04	0.02	0.03	0.22	-0.02	0.01	0.07	-0.12	1.00					
$L.\frac{TSM}{TA}$	-0.03	0.05	-0.05	0.07	0.02	0.03	0.01	-0.02	0.15	0.02	0.02	-0.01	-0.04	1.00				
$L.Sens$	0.00	-0.04	0.12	0.01	0.03	0.02	-0.00	0.01	0.02	-0.11	-0.14	-0.04	-0.09	-0.07	1.00			
$L.Z*C$	0.12	0.11	0.01	0.01	0.10	0.27	0.16	0.03	0.06	0.11	0.71	0.36	0.01	0.07	0.01	1.00		
$L.\frac{TE}{TA}*C$	0.06	0.08	0.00	-0.00	0.01	0.16	0.25	0.04	-0.00	0.03	0.45	0.55	0.01	0.00	0.00	0.64	1.00	
$L.Size*C$	-0.03	0.06	-0.00	0.01	0.05	0.04	0.05	0.48	-0.06	0.01	0.02	0.01	0.48	-0.04	-0.00	0.03	0.00	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 34: Correlation coefficients between the instruments and the variables from level equation (system GMM). Continued (7)

Var	$L3.D.Z$	$L3.D.\frac{TE}{TA}$	$L3.D.Size$	$L3.D.\frac{TSM}{TA}$	$L3.D.Sens$	$L3.D.Z*C$	$L3.D.\frac{TE}{TA}*C$	$L3.D.Size*C$	$L3.D.\frac{TSM}{TA}*C$	$L3.D.Sens*C$	$L.Z$	$L.\frac{TE}{TA}$	$L.Size$	$L.\frac{TSM}{TA}$	$L.Sens$	$L.Z*C$	$L.\frac{TE}{TA}*C$	$L.Size*C$
$L3.D.Z$	1.00																	
$L3.D.\frac{TE}{TA}$	0.41	1.00																
$L3.D.Size$	0.04	-0.17	1.00															
$L3.D.\frac{TSM}{TA}$	-0.08	0.05	-0.01	1.00														
$L3.D.Sens$	0.02	0.03	0.01	0.01	1.00													
$L3.D.Z*C$	0.15	0.07	-0.02	-0.00	0.18	1.00												
$L3.D.\frac{TE}{TA}*C$	0.03	0.00	-0.01	-0.02	0.04	0.60	1.00											
$L3.D.Size*C$	-0.03	0.07	0.02	0.01	0.07	-0.06	-0.06	1.00										
$L3.D.\frac{TSM}{TA}*C$	0.04	0.00	-0.03	0.03	0.11	0.108	-0.11	-0.05	1.00									
$L3.D.Sens*C$	0.03	0.00	0.05	-0.00	0.66	0.27	0.07	0.10	0.16	1.00								
$L.Z$	0.08	0.08	-0.15	-0.01	0.17	0.29	0.15	0.01	0.06	0.13	1.00							
$L.\frac{TE}{TA}$	0.04	0.07	-0.04	-0.02	0.08	0.19	0.24	0.01	-0.00	0.05	0.63	1.00						
$L.Size$	0.00	0.12	0.04	0.00	0.03	-0.02	-0.01	0.28	-0.02	0.03	0.07	-0.09	1.00					
$L.\frac{TSM}{TA}$	-0.03	0.05	-0.05	0.04	0.05	0.03	-0.02	-0.03	0.22	0.04	0.01	-0.01	-0.05	1.00				
$L.Sens$	0.05	-0.10	0.21	-0.06	-0.18	-0.10	-0.03	-0.03	-0.06	-0.36	-0.13	-0.05	-0.08	-0.08	1.00			
$L.Z*C$	0.12	0.11	0.01	0.01	0.10	0.27	0.16	0.03	0.06	0.11	0.71	0.36	0.01	0.07	0.01	1.00		
$L.\frac{TE}{TA}*C$	0.06	0.06	0.00	-0.02	0.08	0.29	0.39	0.00	-0.01	0.08	0.49	0.61	0.02	0.06	0.00	0.64	1.00	
$L.Size*C$	-0.02	0.05	0.01	-0.00	0.06	-0.02	-0.02	0.56	-0.03	0.07	0.02	0.03	0.50	-0.04	-0.01	0.03	0.02	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

Table 35: Correlation coefficients between the instruments and the variables from level equation (system GMM). Continued (8)

Var	$L3.D.Z*B$	$L3.D.\frac{TE}{TA}*B$	$L3.D.Size*B$	$L3.D.\frac{TSM}{TA}*B$	$L3.D.Sens*B$	$L3.D.Z*B*C$	$L3.D.\frac{TE}{TA}*B*C$	$L3.D.Size*B*C$	$L3.D.\frac{TSM}{TA}*B*C$	$L3.D.Sens*B*C$	$L.Z$	$L.\frac{TE}{TA}$	$L.Size$	$L.\frac{TSM}{TA}$	$L.Sens$	$L.Z*C$	$L.\frac{TE}{TA}*C$	$L.Size*C$
$L3.D.Z*B$	1.00																	
$L3.D.\frac{TE}{TA}*B$	0.32	1.00																
$L3.D.Size*B$	-0.21	-0.22	1.00															
$L3.D.\frac{TSM}{TA}*B$	-0.18	0.04	-0.00	1.00														
$L3.D.Sens*B$	0.03	0.08	0.01	0.00	1.00													
$L3.D.Z*B*C$	0.26	0.18	0.00	0.01	0.14	1.00												
$L3.D.\frac{TE}{TA}*B*C$	0.07	0.12	-0.01	0.00	-0.03	0.40	1.00											
$L3.D.Size*B*C$	-0.04	0.13	0.02	0.03	0.10	0.01	0.08	1.00										
$L3.D.\frac{TSM}{TA}*B*C$	0.04	-0.03	-0.05	0.02	0.06	0.18	0.01	-0.10	1.00									
$L3.D.Sens*B*C$	0.03	0.03	0.07	0.02	0.69	0.20	-0.04	0.14	0.09	1.00								
$L.Z$	0.07	0.07	-0.07	0.00	0.08	0.21	0.09	0.02	0.07	0.06	1.00							
$L.\frac{TE}{TA}$	-0.00	0.07	-0.04	0.01	0.03	0.09	0.12	0.04	0.01	0.01	0.63	1.00						
$L.Size$	0.00	0.10	0.09	0.02	0.04	0.02	0.04	0.23	-0.02	0.03	0.07	-0.09	1.00					
$L.\frac{TSM}{TA}$	-0.04	0.04	-0.04	0.04	0.03	0.03	-0.00	-0.04	0.16	0.01	0.01	-0.01	-0.05	1.00				
$L.Sens$	-0.00	-0.06	0.06	-0.02	-0.14	-0.06	0.00	-0.02	-0.03	-0.25	-0.13	-0.05	-0.08	-0.08	1.00			
$L.Z*C$	0.07	0.06	-0.05	0.01	0.08	0.29	0.13	0.04	0.09	0.08	0.74	0.41	0.01	0.06	0.00	1.00		
$L.\frac{TE}{TA}*C$	0.03	0.05	-0.00	0.01	0.02	0.16	0.23	0.04	0.03	0.02	0.49	0.60	0.02	0.00	0.00	0.66	1.00	
$L.Size*C$	-0.03	0.06	0.01	0.01	0.07	0.02	0.06	0.48	-0.05	0.07	0.02	0.03	0.50	-0.04	-0.00	0.03	0.02	1.00

$D.$ in this table stands for first difference, $L.$ stands for the lagged value.

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